United States Patent [19]

Barecki et al.

[11] **3,744,843**

[45] **July 10, 1973**

[54] **VEHICLE CHAIR UNIT**

[75] Inventors: **Chester J. Barecki**, Grand Rapids; **Kenneth W. Hozeski**, Grandville, both of Mich.

[73] Assignee: **American Seating Company**, Grand Rapids, Mich.

[22] Filed: **Jan. 17, 1969**

[21] Appl. No.: **792,031**

[52] **U.S. Cl.** **297/316**, 297/332, 297/355

[51] **Int. Cl.** **A47c 1/12**

[58] **Field of Search** 297/332, 333, 340, 297/353, 354, 335, 336, 359, 355, 316, 324

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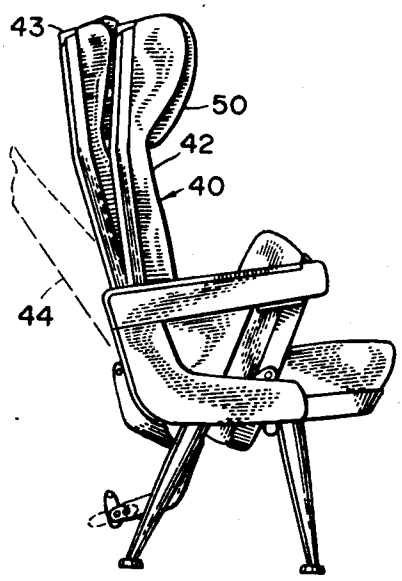
[57] **ABSTRACT**

A chair for a vehicle such as a bus or airplane wherein the back and seat portions are so interconnected to the frame that raising of the seat will automatically bring the back to upright position.

1 Claim, 32 Drawing Figures



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SHEET 1 OF 7

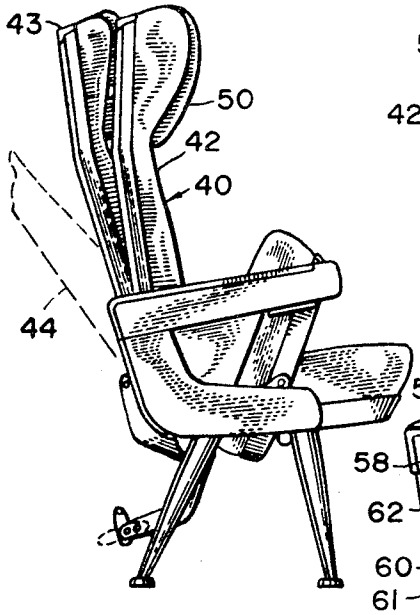

FIG. 1

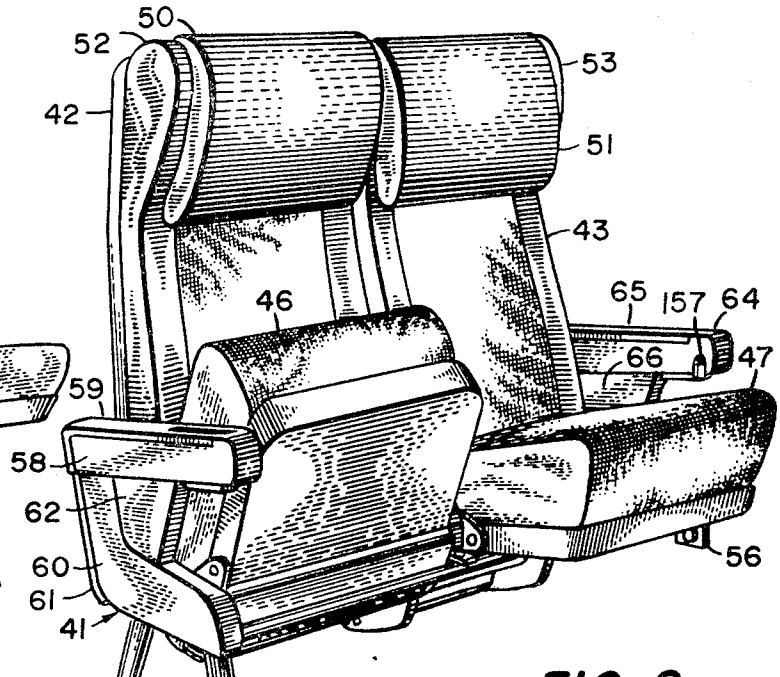

FIG. 2

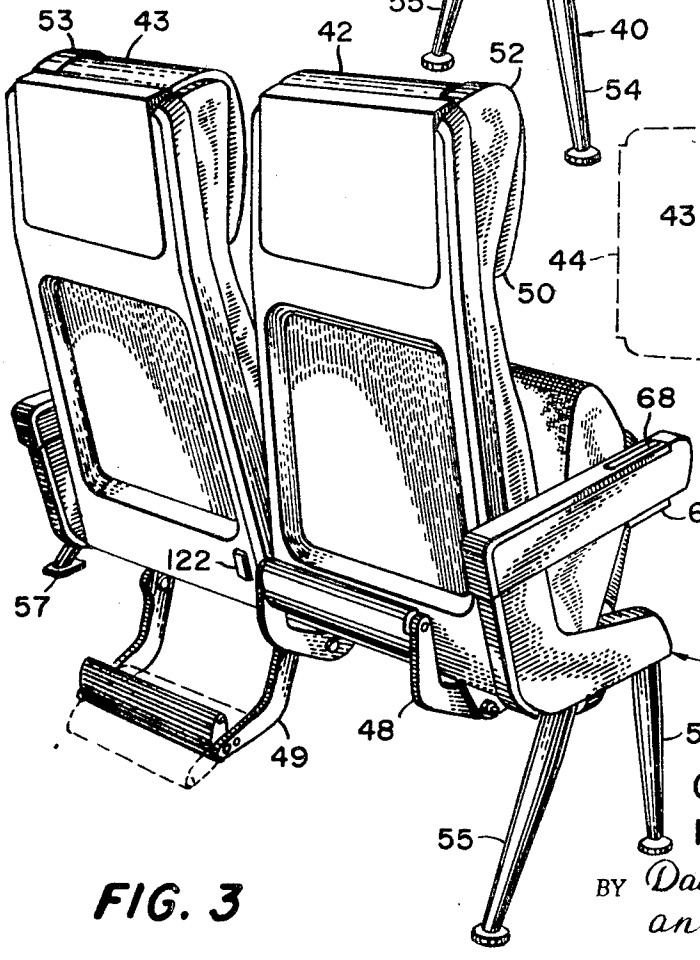

FIG. 3

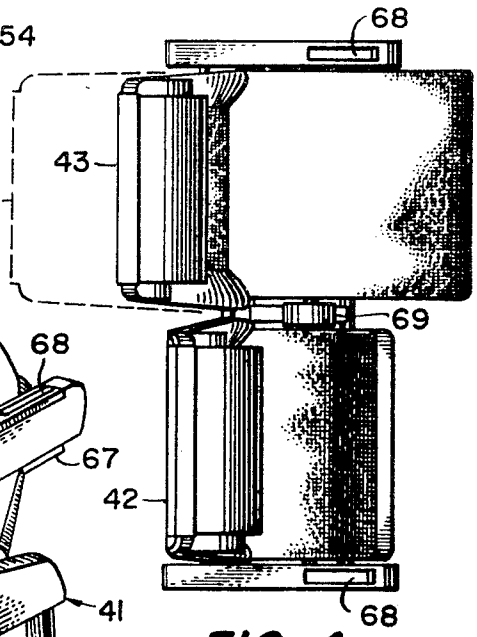

FIG. 4

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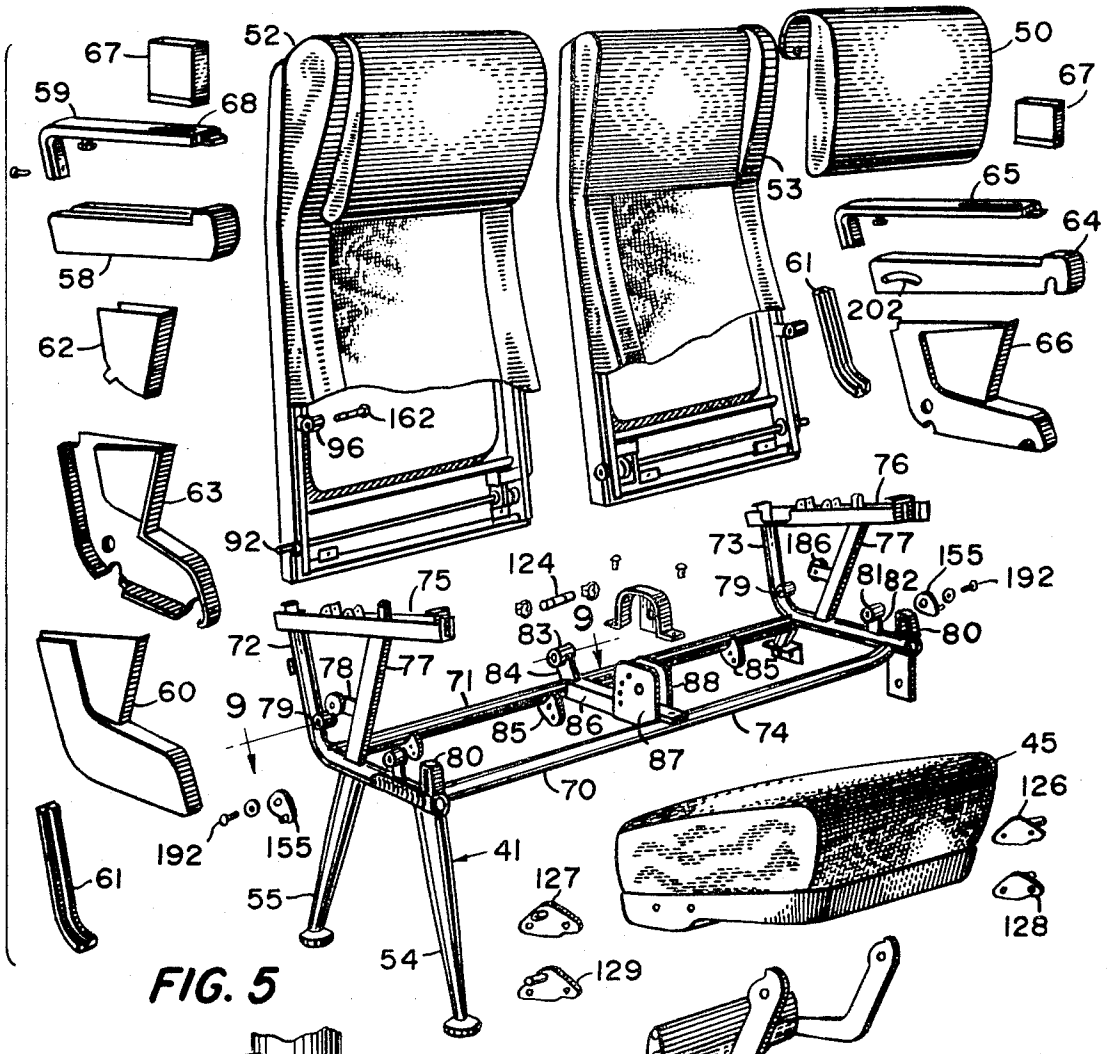

FIG. 5

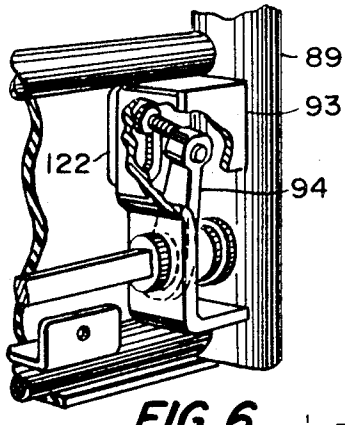

FIG. 6

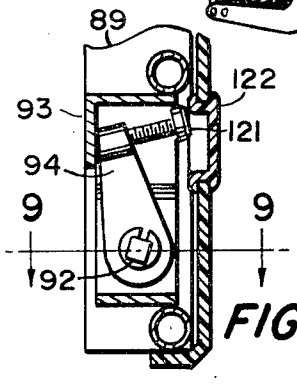

FIG. 7

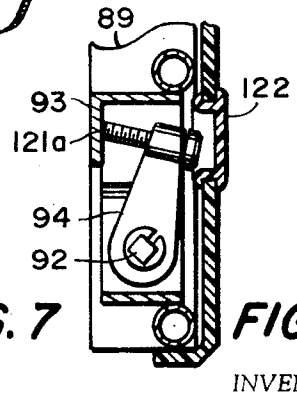

FIG. 8

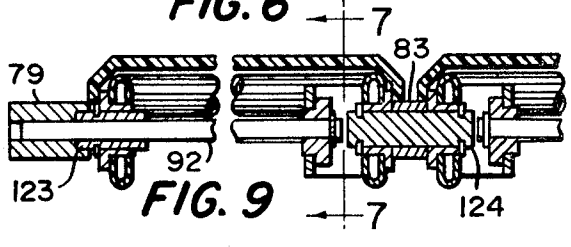

FIG. 9

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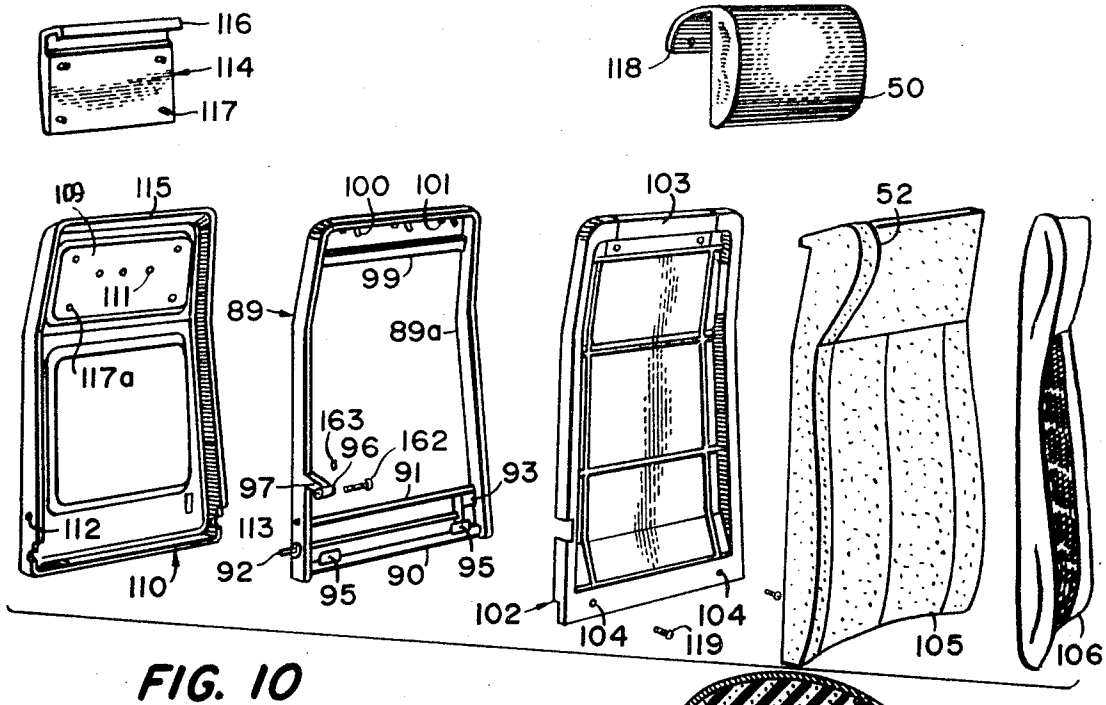

FIG. 10

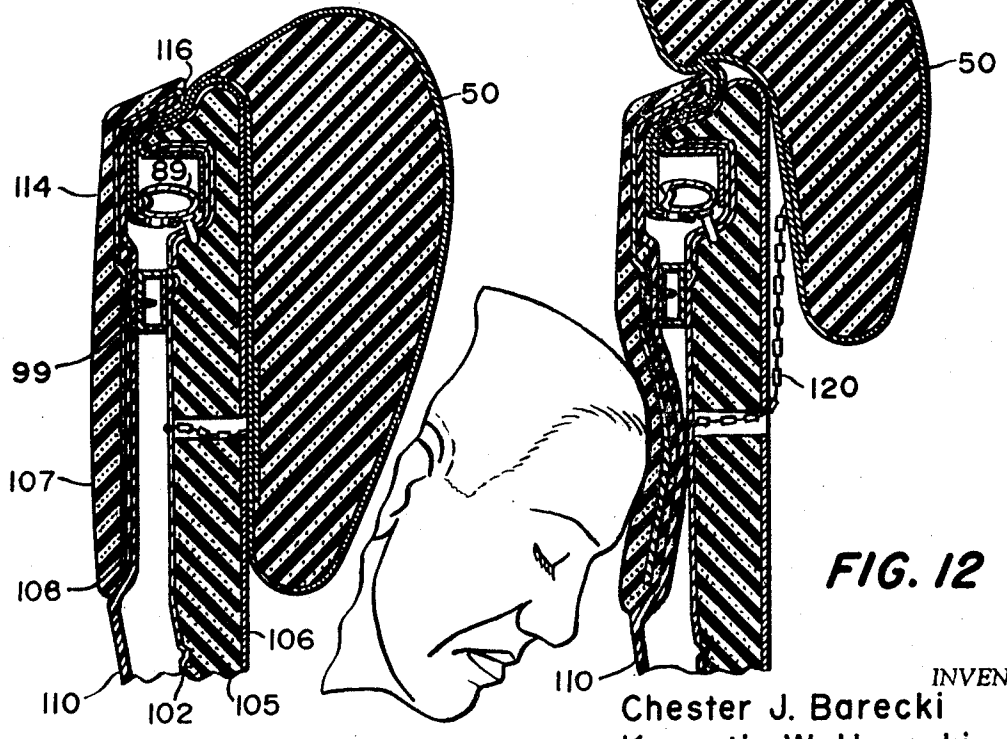

FIG. 11

FIG. 12

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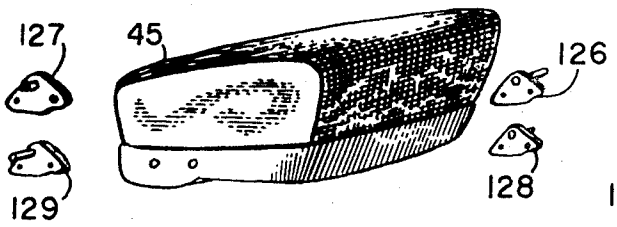


FIG. 13

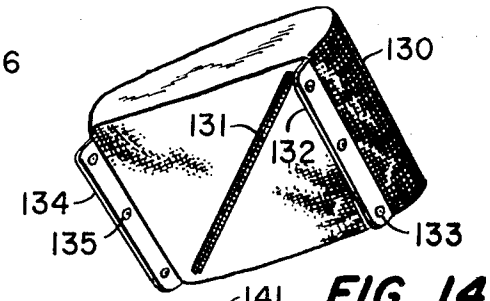
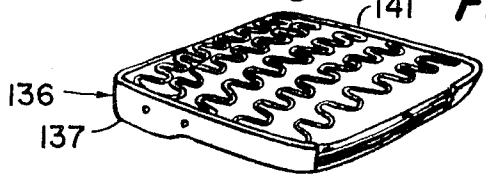


FIG. 14



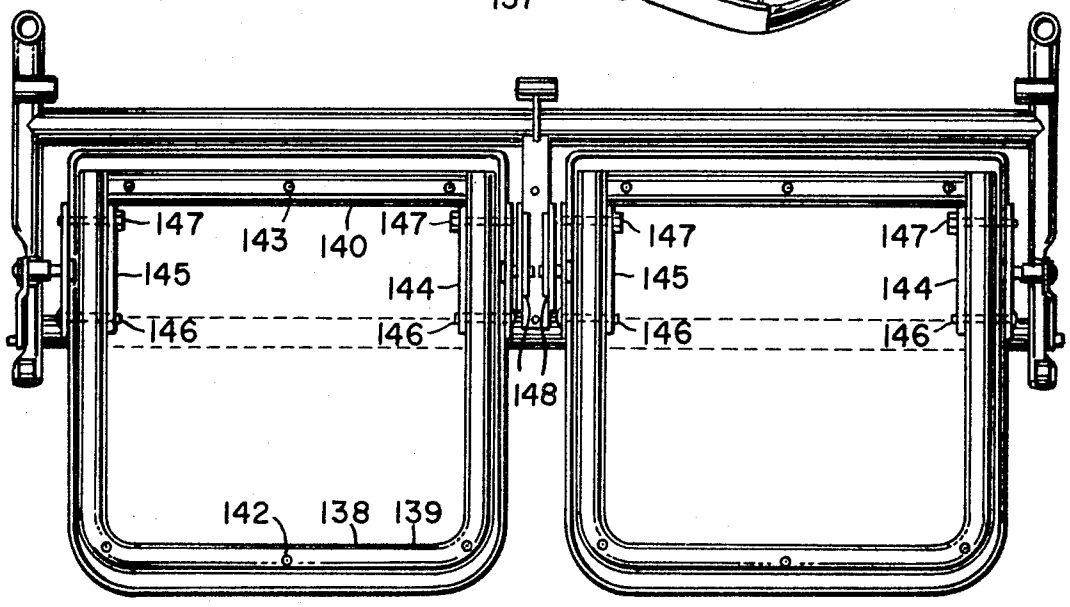


FIG. 15

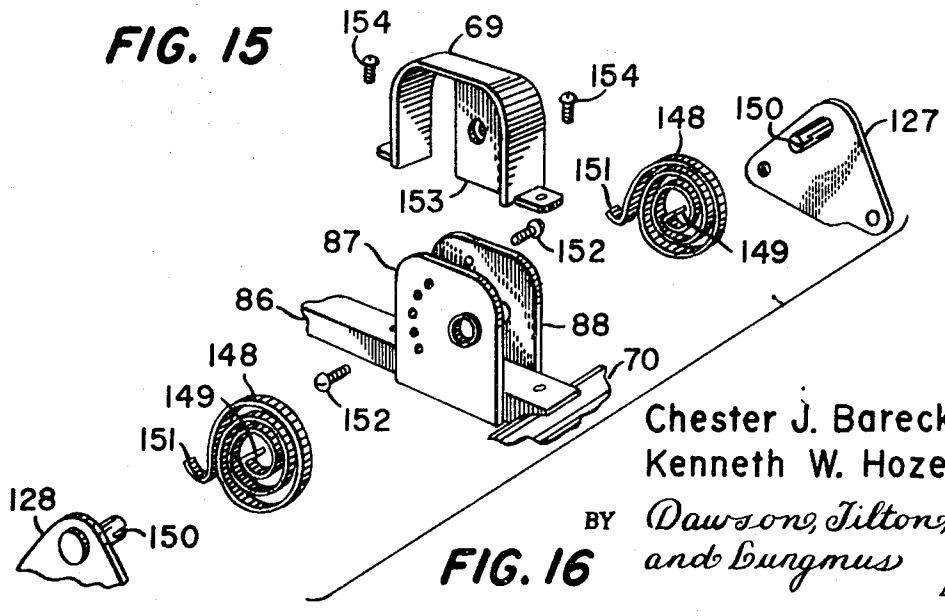


FIG. 16

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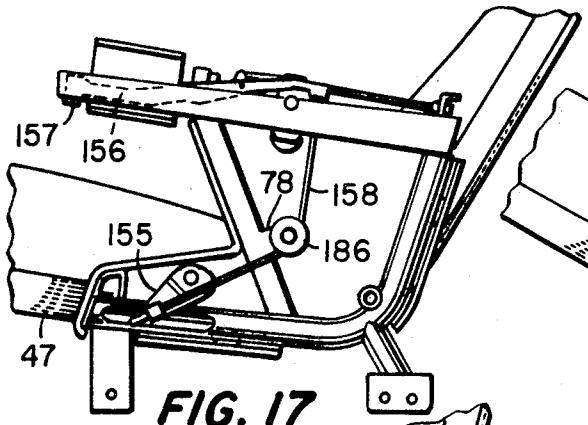

FIG. 17

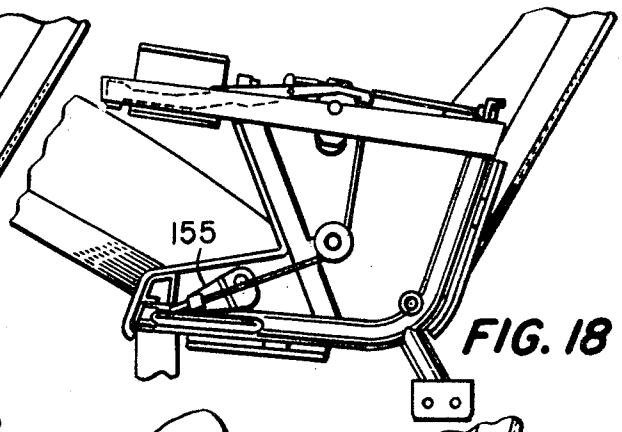

FIG. 18

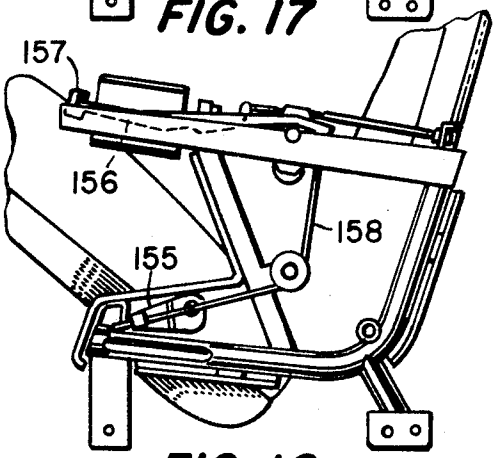

FIG. 19

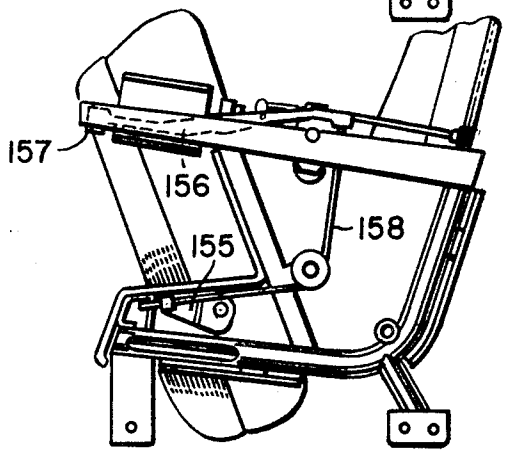

FIG. 20

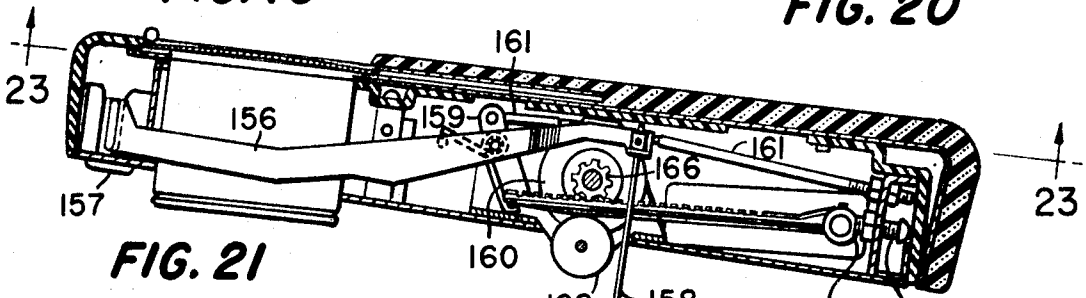

FIG. 21

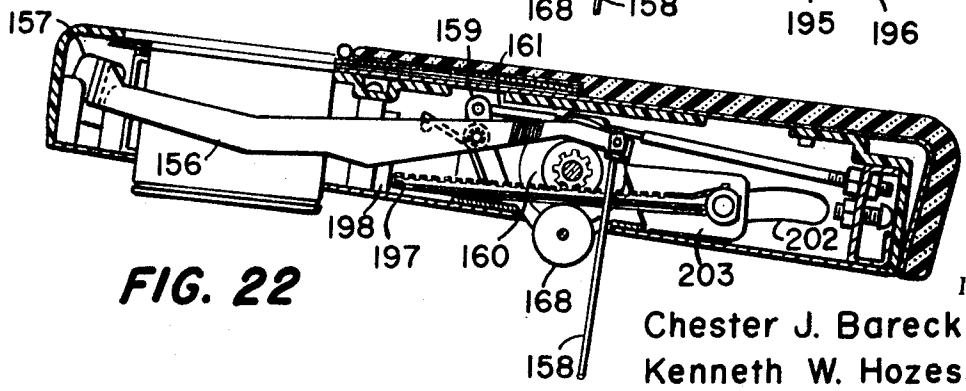

FIG. 22

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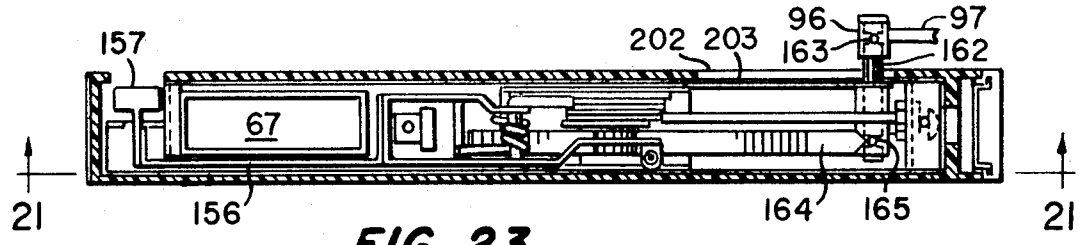

FIG. 23

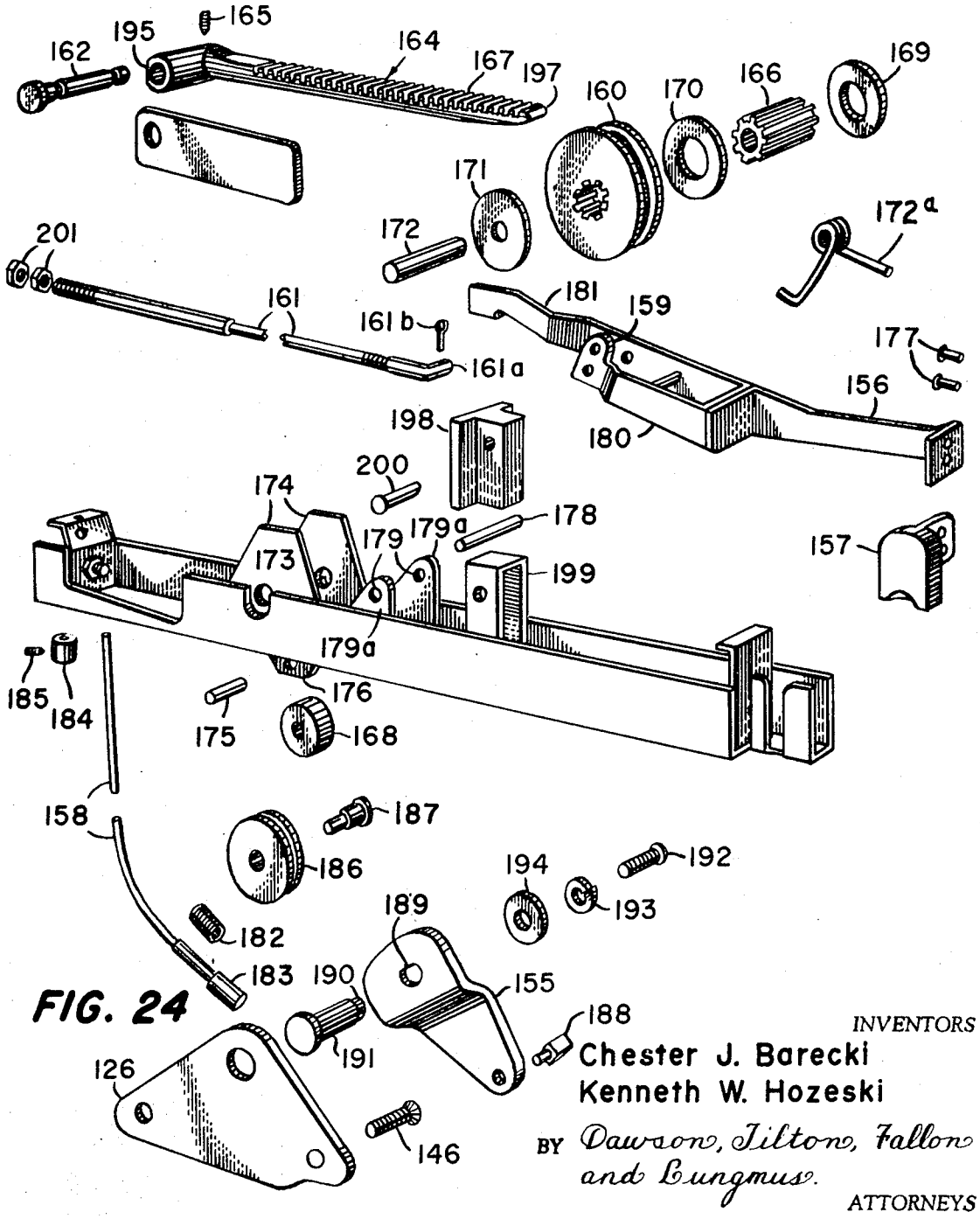

FIG. 24

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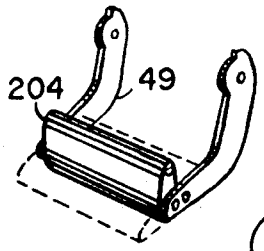

FIG. 25

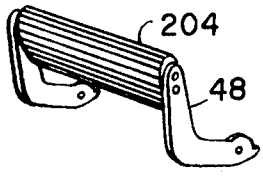

FIG. 26

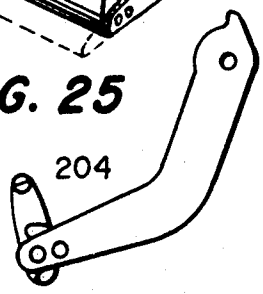

FIG. 27

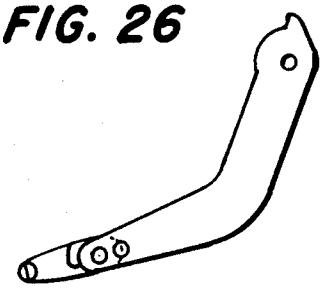

FIG. 28

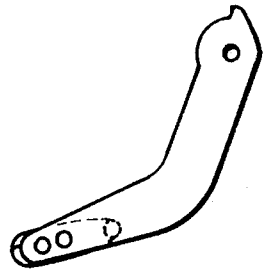

FIG. 29

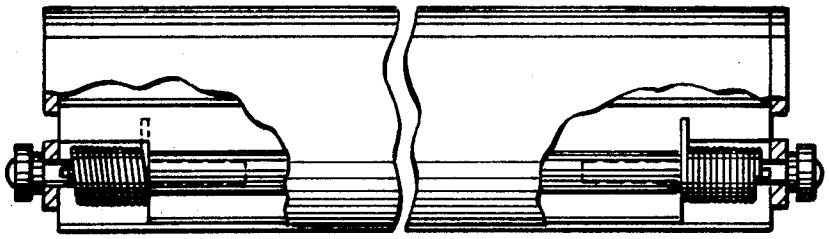

FIG. 30

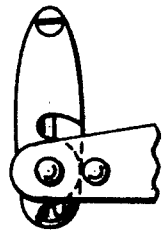

FIG. 31

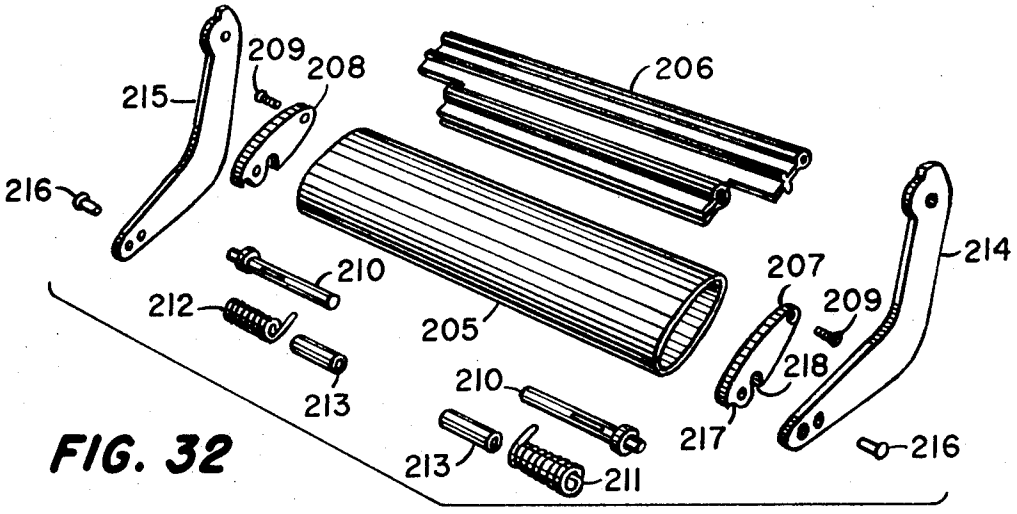

FIG. 32

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VEHICLE CHAIR UNIT

BACKGROUND AND SUMMARY OF INVENTION

Reclinable chairs are uniformly employed in passenger vehicles such as buses and airplanes. To achieve this feature, the backs are pivotable out of a normal generally upright position and this is triggered by the engagement of the chair occupant's finger with a button provided on the arm rest. The occupant then shifts his weight to urge the back rearwardly and away from the normal generally upright position to a desired inclination. In the past, the return to the normal generally upright position has required a duplication of the inclining procedure, i.e., again depressing the button and shifting weight to permit the back to return. In passenger transport vehicles it is important that the backs be positioned in this position at various times such as take-off and landing of airplanes, loading and unloading of airplanes and buses, etc. In the past, if a back has not been brought to the normal generally upright position by the occupant, it is necessary for an attendant to do this with each individual chair. This difficulty is avoided through the practice of the instant invention. According to the invention hereinafter described, the mere rising of the passenger automatically results in both the seat being moved to a stowed position and the back being moved to the desirable normal generally upright position. In providing structure to achieve this desirable operation, we provide an additional advantage. The structure makes it possible for the passenger immediately rearward of a particular chair to push the back toward the normal generally upright position — as would be necessary to permit egress for that passenger. It is a common occurrence in buses and airplanes that a passenger desiring to get out of his seat finds his way blocked by the inclination of the back immediately ahead of him. Now that particular back can be moved readily toward an egress-permitting position yet at the same time the back cannot be pulled by the exiting passenger away from the normal generally upright position. It is a commonplace occurrence for a passenger to grasp the chair back immediately ahead of him to pull on the same to assist in rising and exiting.

The invention is described in conjunction with an illustrative embodiment in the accompanying drawing, in which

FIG. 1 is a side view of a two passenger chair unit, with the near seat and back up, the far seat and back in normal sitting position, while the dotted line shows one back fully reclined;

FIG. 2 is a front perspective view with the seats and backs in the same position as in FIG. 1;

FIG. 3 is a rear perspective view, with the near footrest in the stored position, while the far footrest is ready for use;

FIG. 4 is a top view of the unit to show the difference in available standing space when seat and back are up;

FIG. 5 is an exploded perspective view of the two passenger chair unit;

FIG. 6 is a fragmentary perspective view of the tension adjustment mechanism for the back of the chair unit;

FIG. 7 is a vertical sectional view through the tension adjustment mechanism as seen along the sight line 7—7 of FIG. 9;

FIG. 8 is a sectional view similar to that seen in FIG. 7 but showing the parts thereof in a different operational condition;

FIG. 9 is a fragmentary horizontal sectional view such as would be seen along the sight line 9—9 of both FIGS. 5 and 7;

FIG. 10 is an exploded perspective view of the back;

FIG. 11 is a fragmentary vertical sectional view showing the pillow in its normal position;

FIG. 12 is a view similar to FIG. 11 but showing the pillow in raised condition; and showing a man's head deforming the crash pad and outer panel.

FIG. 13 is a perspective view of a seat and two sets of pivot blocks which can be employed to make a given seat either right handed or left handed;

FIG. 14 is an exploded perspective view of the seat showing the detachable seat cushion separated from the seat pan;

FIG. 15 is a horizontal sectional view of the lower part of the unit frame showing the two seat pans without serpentine springs and with the center spring housing removed;

FIG. 16 is a fragmentary exploded perspective view of the center spring housing of FIG. 15 showing the several parts thereof;

FIG. 17 is a fragmentary side view of the wall side of the two chair units with the arm rest cover removed and with the back in reclined position to show the automatic storage mechanism in the lower locked position;

FIG. 18 is a view similar to FIG. 17 with the automatic storage mechanism still in lower locked position but with the seat raised part way;

FIG. 19 is a view similar to FIGS. 17 and 18 but with the seat raised halfway up and the automatic storage mechanism unlocked;

FIG. 20 is a view similar to FIGS. 17–19 but with the seat and back raised and with the automatic storage mechanism in the upper locked position;

FIG. 21 is a fragmentary transverse sectional view of the automatic storage mechanism taken with the near wall of the arm rest cover removed (as along the sight line 21—21 of FIG. 23) and with the automatic storage mechanism in locked condition;

FIG. 22 is a view similar to FIG. 21 but with the automatic storage mechanism unlocked;

FIG. 23 is a transverse horizontal sectional view of the arm rest mechanism as would be seen along the sight line 23—23 of FIG. 21;

FIG. 24 is an exploded perspective view of the entire automatic storage mechanism as viewed in the direction opposite to that of FIG. 23;

FIG. 25 is a perspective view of the footrest in the normal position for use with dotted lines showing the forward position of the pad for tall people and the rearward position of the pad for shorter people;

FIG. 26 is a perspective view of the foot rest in the normal stored position;

FIG. 27 is a side view of the footrest with the pad in neutral position;

FIG. 28 is a view similar to FIG. 27 but with the pad in the rearward position as used by a short person;

FIG. 29 is a view similar to FIGS. 27 and 28 but with the pad in the forward position, as used by a tall person;

FIG. 30 is a rear view of the pad in the neutral position with portions of the shell removed to show the opposite tension on the two springs;

FIG. 31 is a fragmentary side view of the foot rest; and

FIG. 32 is an exploded perspective view of the foot rest.

Referring now to Sheet 1 of the drawings, the numeral 40 designates generally a chair unit constructed according to teachings of the instant invention. The chair unit pictured has two chairs so as to accommodate two occupants and is useful, as pointed out previously, particularly for passenger transports such as buses or airplanes. Each unit 40 has a frame generally designated 41 which supports two backs 42 and 43 respectively (as seen in proceeding from left to right in FIG. 2, for example). The back designated 43 is seen in a partially reclined position while the back 42 is in the normal generally erect position as is desirable for storage. The numeral 44 (seen only in FIGS. 1 and 4) is applied to a dotted line configuration of the back corresponding to the fully reclined position. The seat per se is designated by the numeral 45 (see FIGS. 5 and 13) and until fitted with pivot blocks can be used with either of the backs 42 or 43. In the illustration given in FIG. 2, the seat for the right hand occupant (considered from the standpoint of the occupant) is designated 46 while the other seat is designated 47. Each chair is equipped at the rear with a footrest as at 48 relative to the back 42 and 49 relative to the back 43 (see particularly FIG. 3). The footrest 48 is in the stowed position while the footrest 49 is in the "use" position.

Each back 42 or 43 is equipped with a pillow 50 or 51. The back 42 (which is adjacent the aisle) has a wing 52 on the aisle side while the back adjacent the wall has a wing 53 on the wall side. Each wing 52 or 53 is constructed of firm foam material to prevent the head of the occupant from rolling off the pillow — as during turning of the vehicle.

EXPOSED ELEMENTS OF FRAME 41

The visible parts of the frame 41, as seen in FIGS. 2 and 3 and employed for mounting the seats and backs, include a front aisle leg 54 and a rear aisle leg 55. Each of these is fastened to the platform floor from below so that the usual flanges and bolt heads can be omitted. The frame 41 further includes a front wall mounting bracket 56 and a rear wall mounting bracket 57. As best seen in FIG. 2, the frame 41 further includes an aisle arm 58 with its soft foam pad 59, a plastic panel 60 with its bumper strip 61, a stainless steel cigarette-snuffing panel 62, a plastic inner panel 63 (see FIG. 5), a wall arm rest 64 with its pad 65 and its inner plastic panel 66. An ashtray 67 is provided in each arm with a sliding cover 68 (see FIG. 3) built into the arm pads 59 and 65. A center spring housing 69 is provided between the seats.

HIDDEN PORTIONS OF FRAME 41

The hidden or inside parts of the frame as seen in the lower central portion of FIG. 5 include a front stretcher tube 70 and a rear stretcher tube 71 interconnected with an aisle curved end tube 72 and a wall curved end tube 73. The interconnection of these four elements forms a generally planar rectangular structure designated 74. Projecting forwardly from the aisle curved end tube 72 is an arm channel 75 and the counterpart arm channel for the wall tube 73 is designated 76. Each arm 75 and 76 is further supported by a brace 77. Projecting rearwardly from each brace 77 is a pulley bracket 78 which is employed in connection with the automatic storage mechanism to be described hereinafter in connection with FIGS. 17–24.

Still continuing with the inner portions of the frame 41, it will be seen from the lower portion of FIG. 5 that each curved end tube 72 and 73 is equipped with an outer back bearing 79, the function of which will be described in conjunction with FIG. 9. The frame 41 further includes a panel support bracket 80 at the extreme forward end of the curved end tubes 72 and 73. Projecting upwardly from the curved end tubes 72 and 73 somewhat rearwardly of the support brackets 80 is a pair of bearing supports 82 each carrying a seat bearing 81 (designated only relative to the curved end tube 73). Also projecting upwardly from the planar frame 74 and intermediate the ends of the rear stretcher tube 71 is a center bearing support 84 with its bearing 83. This bearing cooperates with the outer back bearings 79 as seen in FIG. 9. Other elements of the frame 41 as seen in FIG. 5 include a fore-and-aft square thwart 86 which provides a base for the right hand and left hand center spring support plates 87 and 88. Four mounting brackets 85 for the two foot rests hang from stretcher tube 71, and are directed forwardly so as not to be a hazard to shins.

DETAILS OF BACK

Referring now to FIG. 10, the back 42 or 43 consists of a number of parts, so assembled as to form the plastic outer shell and the cushion. For this purpose, a steel frame 89 (designated in the second view from the left in FIG. 10) includes a U-shaped frame 89*a*, a lower stretcher tube 90 and a second stretcher tube 91 thereabove integrated to provide a generally rectangular framework.

Still referring to FIG. 10 and to the second from the left-hand view, it will be seen that a torsion rod 92 is mounted on the U-shaped frame 89*a* and extends parallel to and between the stretcher tubes 90 and 91. At one end of the torsion rod 92, a housing 93 is provided which provides an enclosure for the tension-producing yoke 94 (see also FIGS. 6–9). Still referring to FIG. 10, the extreme lower portion of the second hand view illustrates the fact that the frame 89 is equipped with brackets 95 for attaching the back cushion. Along the side of the frame 89*a* opposite the housing 93, there is provided a forwardly-extending support 97 with a bearing 96 thereon which is employed for adjusting the inclination of the back (to be described in connection with FIG. 23 hereinafter). The frame 89*a* further includes a transverse member 99, three projections 100 for supporting the cushion and three snaps 101 for the pillow 50. The back is determined to be right-hand or left-hand by the location of the back adjustment bearing 96 which has to be on the arm rest side of the back, and by the housing 93 which has to be near the center bearing 83.

The aluminum inner panel 102 (see the middle view in FIG. 10) has a reinforcement 103 at its top to strengthen that area. There are perforations provided (not shown) into which the three projections 100 fit (see FIGS. 11 and 12). The panel 102 also has two screw holes 104 at its bottom edge for attachment to the tubular frame 89*a* at 95. The foam pad 105 (second from the right-hand view in FIG. 10) is cemented to the aluminum inner panel 102, and then the upholstery cover 106 is pulled over the pad. The edges of the up-

holstery cover are cemented to the back side of the aluminum inner panel **102** and the thus arranged subassembly becomes the cushion which can be removed without removing the entire back from the frame **41.** Provided as an attachment to the frame **89** is a crash panel **114** which includes a foam pad **107** and a thin piece of aluminum **108** received on a slanted portion **109** of a plastic panel **110.**

The plastic outer panel **110** is attached to the steel frame **89** with three screws through the holes **111** into the member **99,** and one screw on each side through holes **112** into holes **113.** The crash panel **114** is hooked over the upper edge **115** of the outer panel by a hooked edge **116,** and its four screw studs **117** slip through the four holes **117***a* in the outer panel, after which nuts are suitably attached. This procedure hides the attachment screws for the panel and pad and discourages vandalism. The pillow **50** is attached to the frame by threading the flap **118** between the top flange of the outer panel **115** and the frame **89** and snapping it onto the three snaps **101** on the bottom side of the tube. This procedure can be seen in FIGS. **11** and **12.**

The cushion assembly is attached to the frame by sliding the three projections **100** of the tube through the three holes in the inner panel (see FIG. **11**) and pushing the cushion until two screws **119** can be inserted through the holes **104** and into the brackets **95.** A chain **120** attaches the pillow **50** to the inner panel **102,** through the cushion, so that it has limited upward movement (see FIG. **12**). To remove the cushion, it is first necessary to remove the screws **119** and the chain **120,** slide the cushion down and lift it out. The pillow may then be replaced when the cushion is being replaced.

OPERATION OF BACK

The means permitting pivotal movement of the back to various inclined positions can be appreciated from a consideration of Sheet **2** of the drawing. The pivot axis of the back is along the torsion rod **92,** more especially along the axes of the bearings **79** and **83** (see FIGS. **5** and **9**). The torsion bar is responsible for biasing the back to its normal generally upright position and this is effected through the yoke **94** which is located in housing **93** at the lower end of the frame **89.** As the back is inclined, the amount of torque is increased to increase the bias for readily returning the back to upright position. The amount of torque initially applied to the torsion bar can be varied by the adjustment screw **121** which spaces the yoke **94** from the housing **93** (compare FIGS. **7** and **8** in the area designated **121a**). A small cap **122** covers the necessary opening in the back **110** to permit the adjustment of the tension adjusting screw **121.** The end of the torsion bar **92** opposite that equipped with the yoke **94** is fixed in the outer bearing **79** as seen in FIGS. **5** and **9.** An intermediate bearing **123** (see FIG. **9**) is provided through which the torsion bar passes and which absorbs the weight of the back and the back swivels on this bearing. On the other side of the back, a center pin **124** (still referring to FIG. **9**) is held by the center back bearing **83** and acts as a swivel for both backs **42** and **43.** Thus, the torsion bar has one end fixed to the frame (via the bearing **79**) and the other end fixed to the back (via the yoke **94**). Torquing of this bar is achieved by pivoting of this back relative to the bearings **123** and **83** provided on the frame **41.**

SEAT ASSEMBLY

The seat assembly **45** is common to both seats **46** and **47** until the pivot blocks **126–129** are attached to it. When pivot block **126,** a left-hand long shaft pivot is attached to the left side, and pivot block **127,** a right-hand short shaft pivot is attached to the right side, the seat becomes a left-hand seat **47.** However, when pivot block **128,** a left-hand short shaft pivot is attached to the left side and pivot block **129,** a right-hand long shaft pivot is attached to the right side, the seat becomes a right-hand seat **46** as in FIG. **13.**

Still referring to Sheet **4** of the drawing, the seat cushion consists of a piece of foam wrapped in an upholstered sack-like cover **130** which is zippered **131** for easy wrapping and removal of the cover. The cover **130** has two flaps, one flap at the front **132** with three snaps **133,** and a second flap at the rear **134** with three snaps **135.** These flaps and snaps permit a fast removal and replacement of the seat cushion without the necessary removal of the seat pan **136** from the frame **141.**

The seat pan assembly **136** includes a plastic shell **137** which contains a frame of tubing **138.** The frame **138** includes a U-shaped tubular sub-frame **139** and a rear stretcher tube **140.** In extending across the subframe **139** are several serpentine springs **141.**

The front side of the U-tube frame **139** is equipped with three snap posts **142** to receive the three snaps **133** of the front flap **132** and three snap posts **143** are provided on the rear stretcher tube **140** to receive the three snaps **135** of the rear flap **134** of the cushion **130.**

The seat pan assemblies **136** are attached to the frame **41** by means of the four pivot blocks **126–129.** For this purpose, four angles, two left-hand angles **144** and two right-hand angles **145** are placed at the sides of the tubular frame **138** and then bolts **146** are inserted through the pivot blocks, the tubular frame **138** and then threaded into the angles **144** and **145.** These bolts can be removed and replaced from the outside of the seat pan. Bolts **147** are inserted through the angles **144** and **145,** the tubular frame **138** and are threaded into the pivot blocks **126–129,** as the case may be. This arrangement can be seen in FIG. **15.**

The seats rise automatically by means of clock springs **148** (see FIG. **15**) which are attached to the short shaft of the pivot blocks **127** and **128** by having the bent end **149** slip into the slot **150** of each shaft, while the hooked end **151** grasps a screw **152.** The screws **152** are threaded through the right-hand and left-hand center spring housing plates **87** and **88** respectively. The springs **148** are located on the inside face of each spring housing plates **87** and **88** as can be seen by reference to FIGS. **15** and **16.** The springs are kept in place by a spacer **153** welded to the inside of the center spring housing. The housing is attached to the center thwart **86** by two screws **154** and conceals the springs.

AUTOMATIC RETURN OF BACK

FIGS. **17–24** illustrate the automatic raising of the seat and back when the occupant stands, as well as the adjustment of the back to a fully reclined position by the use of the adjustment button in the front end of each arm rest.

FIG. **17** shows the seat down and the back fully reclined, although the back could be in any position from that of fully erect to fully reclined as shown in FIG. **1,**

with the seat down. The control arm 155 (designated in FIGS. 17–20 and 24) is down, allowing the adjustment lever 156 to be down. The adjustment button 157 is in the forward part of the arm rest. Then as the occupant begins to stand up, the seat rises as in FIG. 18, raising the control arm 155, but not enough to unlock the automatic storage mechanism. As the seat continues to rise as in FIG. 19, the control lever 155 reaches about its midway point of arcuate travel, pulling on the cable 158 enough to pull the adjusting lever 156 up (the button 157 being up — see FIG. 22), unlocking the mechanism which lets the back rise automatically due to the action of the torsion bar 92. In FIG. 20, the seat and back are up moving the control arm 155 to the upper locked position because its pull on the cable 158 has ended, allowing the adjustment lever 156 to come back down to its natural locked position, keeping the back from being moved. When a person sits down on the seat and thereby lowers it, the back will remain in its normal generally upright position until the occupant releases the back from this locked position by pushing up on the button 157. This raises the adjustment lever 156 and unlocks the automatic storage mechanism. When the occupant leans back as far as desired and thereafter releases the button 157, this lowers the adjustment lever 156 and locks the back 42 in the desired position.

LOCKING MECHANISM

The operation of the locking mechanism can be best understood from a consideration of FIGS. 21–23. After the operation is described, details of the construction will be set down with reference to these figures and additionally relative to the exploded view in FIG. 24.

The adjustment lever 156 is raised, either by pushing the button 157 up or by raising the seat 47, causing the finger 159 to move closer to the reel 160. This releases the grip that the locking cable 161 has on the reel, permitting the back to be moved. As it moves, the adjustment bearing 96 moves, also moving the pin 162. The pin is held in place by a set screw 163 and movement of the pin 162 moves the rack gear 164. The rack gear is held by the set screw 165. Movement of the rack gear 164 turns the pinion gear 166 and the reel 160. As soon as the adjustment lever 156 is lowered, the cable 161 pulls tightly on the reel 160, stopping and locking everything beyond it.

The rack gear 164 is a series of teeth 167 which engage the teeth of the pinion gear 166 and rides between the pinion gear 166 and a guide wheel 168 and and spacer washers 169 and 170. A spacer washer 171 is provided on the other side of the reel 160. The pinion gear is on a shaft 172 which is held in holes 173 of bracket 174 provided as part of the arm channel 76 (see FIG. 24). The guide wheel 168 is mounted on a shaft 175 which fits into the lower protrusions 176 of bracket 174.

The button 157 is attached to the adjustment lever 156 by rivets 177. The lever 156 turns on shaft 178 which rests in holes 179 of projections 179a of bracket 174. The lever 156 has two arms 180 and 181. The arm 180 ends in the finger 159 while the arm 181 is pulled down by the cable 158. A spring 178a biases the arm 181 upwardly. The cable 158 has a spring 182 at its lower end 183 and an adjustment clamp 184 and set screw 185 at the upper end where it attaches to the lever arm 181. The cable rides in a pulley 186 with a shoulder rivet 187 which attaches to the pulley bracket 78. The lower end 183 of the cable 158 is held in the swivel ending 188 of the control arm 155. The control arm 155 has a D-type hole 189 which fits into the D-shaped end 190 of the shaft 191 welded into the hole of the let-hand long shaft pivot block 126 or the right-hand long shaft pivot block 129 — see FIG. 15. The control arm 155 is held onto the shaft by a screw 192 with a lock washer 193 and a flat washer 194.

When the rack gear 164 is all the way back, as in FIG. 21, its flat end 195 strikes the adjustable back stop screw 196. When the rack gear 164 is all the way forward, as in FIG. 22, its front end 197 strikes the rubber stop 198 held in its bracket 199 by the rivet 200. The tension on cable 161 can be adjusted by the nuts 201. The forward end 161*a* of the cable 161 fits into a hole in finger 159 and is held by a pin 161*b*. The pin 162 slides back and forth in the opening 202 (see FIG. 22) which is protected by a sliding cover plate 203 (see FIG. 23) to keep exploring fingers from being pinched.

What we have provided is a friction lock mechanism in the form of a winch which includes the reel 160. Entrained around the reel 160 is the cable 161 which is secured at its forward end to the lever 156, more particularly, in the arm portion 180 having the finger 159. The rear end of the cable 161 is fixed within the arm channel 76. Thus, when the button 157 is moved from the FIG. 21 to the FIG. 22 position, the tension on the cable 161 is slackened permitting rotation of the winch reel 160. With the locking mechanism in this condition, the back may be inclined or returned to normal generally erect position in the fashion currently practiced in the art. This includes the shifting of the weight of the occupant to achieve the change in position of the back. So long as the button 157 is depressed, the back can be considered in a floating condition, movable either forwardly or rearwardly as taste dictates. However, all during this time, there is a continued bias effected by the torque contained in the torsion bar 92.

The same release of a locking mechanism is achieved through the agency of raising the seat — as by the occupant standing to exit or to permit another passenger to pass by. Wen this occurs, the seat automatically rises to erect position through the agency of the clock springs 148 — see FIG. 16. This action is transmitted directly to the pivot blocks provided on the sides of the seat, as for example the pivot block 126 seen in the extreme lower portion of FIG. 24. The control arm 155 which is connected to the pivot block 126 moves correspondingly and exerts a tension on the linkage extending between it and the lever 156 i.e., via the cable 158 which is reeved about the pulley 186. It will be noted that the cable 158 is connected to the lever 156 on the opposite side of the fulcrum shaft 178 from the button 157. Thus, downward movement of the arm 181 of the lever 156 effects the same operation as the upward movement of the button 157. As the frictional engagement of the winch cable 161 relative to the reel 160 is relaxed, the back moves forwardly under the bias of the torsion rod 92. Inasmuch as the back has the bearing 96 fixed to it by virtue of the support 97 (see the second from the left-hand view in FIG. 10 and the extreme upper right-hand portion of FIG. 23), the pin 162 which is fitted in the bearing 196 moves forwardly with the back and urges the rack gear 164 forwardly. Thus, when the frictional engagement of the cable 161 with

the reel **160** is reinstituted, the rack holds the back in place against further movement.

A passenger sitting in a chair immediately behind a unit equipped with the invention is benefited from the fact that the forward pressure on the inclined back tends to overcome the friction in the winch and aided by the bias of the torsion rod **92** permits such a passenger to push the seat forward somewhat, facilitating egress. At the same time, it is the case that such a passenger requires assistance in arising and for this purpose grasps the back of the chair ahead of him to rise. In so doing he exerts a backward force on the back but this is resisted not only by the frictional engagement of the cable **161** with the winch reel **160** but also by the torsion rod **92** so that the back serves as a support to permit the passenger to arise without pulling the back toward him.

FOOT REST

The action of the foot rest is illustrated in FIGS. **25–32.** When the footrest **48** is in the stored position as in FIG. **26,** the pad **204** is forced down by the outer panel **110,** but when the footrest **49** is turned down as in FIGS. **25** and **27,** the pad is in a neutral position. The pad can be turned back for a short person as in FIG. **28** or forward as in FIG. **29** for a taller person.

The footrest **49** includes as the essential reinforcing element, an extruded member **206** (see particularly FIG. **32**) which is enclosed in a shell **205.** The pad which this develops is completed at the end by means of a right-hand end piece **207** and a left-hand end piece **208.** The end pieces are secured to the reinforcement **206** by means of screws **209.**

The pad thus assembled is disposed between a pair of arms **214** and **215** which are pivotally mounted on the frame **41.** Each arm is somewhat L-shaped and at the end opposite the mounting on frame **41** is equipped with an aperture for the receipt of a slotted shaft **210,** two of which are provided. The slotted shafts **210** are insleeved with springs **211** and **212** (see FIG. **30**) and further equipped with bushings **213** which are received within the extruded reinforcement **206.** Completing the assembly are stop pins **216** and stops **217** and **218** on the end pieces **207** and **208.**

In the operation of the device, the stop pin **216** hits the rear stop **217** to halt the pad in its rearward turn and hits the forward stop **218** to end the forward motion of the pad. The return of the pad to its neutral position is achieved through the agency of the springs **211** and **212.** These springs are identical but are installed oppositely. The spring **211** is arranged to bring the pad back from the rearward position of FIG. **28** and the spring **212** is arranged to bring the pad back from the forward position of FIG. **29.** Each spring is turned so that it has 45° of tension so that when it is turned against itself it develops a maximum of 135° of tension to bring the pad back to neutral, and when it is turned the other way it has a minus tension of 45° which makes it inactive, while the other spring is functioning. The springs are set with 45° tension to keep the pad rigid in the neutral position so that it will not wobble or be noisy.

The plastic outer panel **110,** in addition to cooperating with the foot rest **48** as indicated previously, provides a deformable support for the crash panel **114.** As pointed out above, the crash panel **114** includes the thin sheet or piece of aluminum **108** and the foam pad **107.** The foam pad **107** possesses its own tough skin so that it does not have to be upholstered. The thin aluminum panel **108** becomes energy-absorbing when struck a hard blow, so that when the occupant of the chair behind (see FIG. **12**) is thrown against the crash panel, the aluminum deforms, absorbing the energy, thus preventing the occupant from receiving a hard skull-fracturing blow.

While in the foregoing specification a detailed description of an embodiment of the invention has been set down for the purpose of illustration, many variations in the details herein given may be made by those skilled in the art without departing from the spirit and scope of the invention.

We claim:

1. A vehicle chair unit comprising a support frame; a pair of seats and a pair of backs pivotally mounted side by side on said support frame, each back having a chair unit frame; a locking mechanism on said support frame for each chair back, each mechanism coupled to the outer side of its associated chair back for independently positioning its associated back in a plurality of reclining locked positions relative to a normal generally-upright locked position of said back; a control connecting means connecting each locking mechanism and its associated seat for releasing said locking mechanism irrespective of the various recline positions occupied by the back when said seat moves through an intermediate path between a lower back-locking position and an upper back-locking position; a torsion bar on said support frame for each back and tensioned to move its associated back to said upright position during said intermediate travel of said seat, each torsion bar fixed to the outer sides of said support frame, each torsion bar being further coupled to the inner side of its associated chair back, each bar at its inner end being further equipped with means for adjusting its tension; and spring means on said frame continuously urging said seats through said intermediate travel and to said upper locking position whereby when an occupant of a seat rises the back associated with that seat from any recline position is automatically raised and locked in upright position.

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