Aug. 24, 1937. LE GRAND S. WHEDON ET AL 2,091,088

ADJUSTABLE SEAT MECHANISM

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Fig. 1.

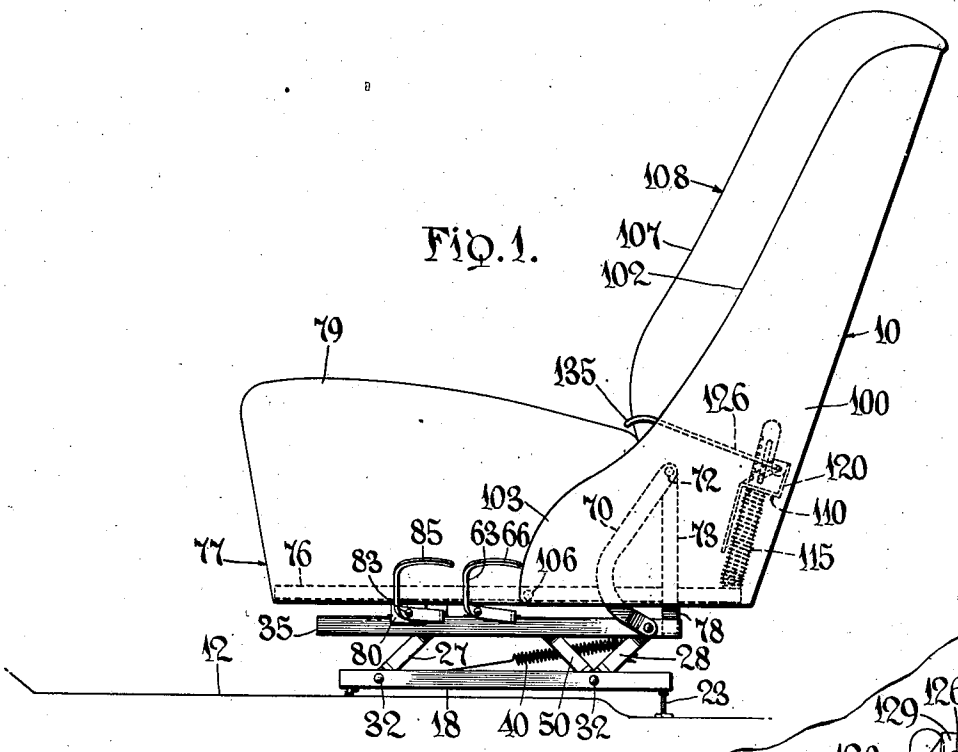
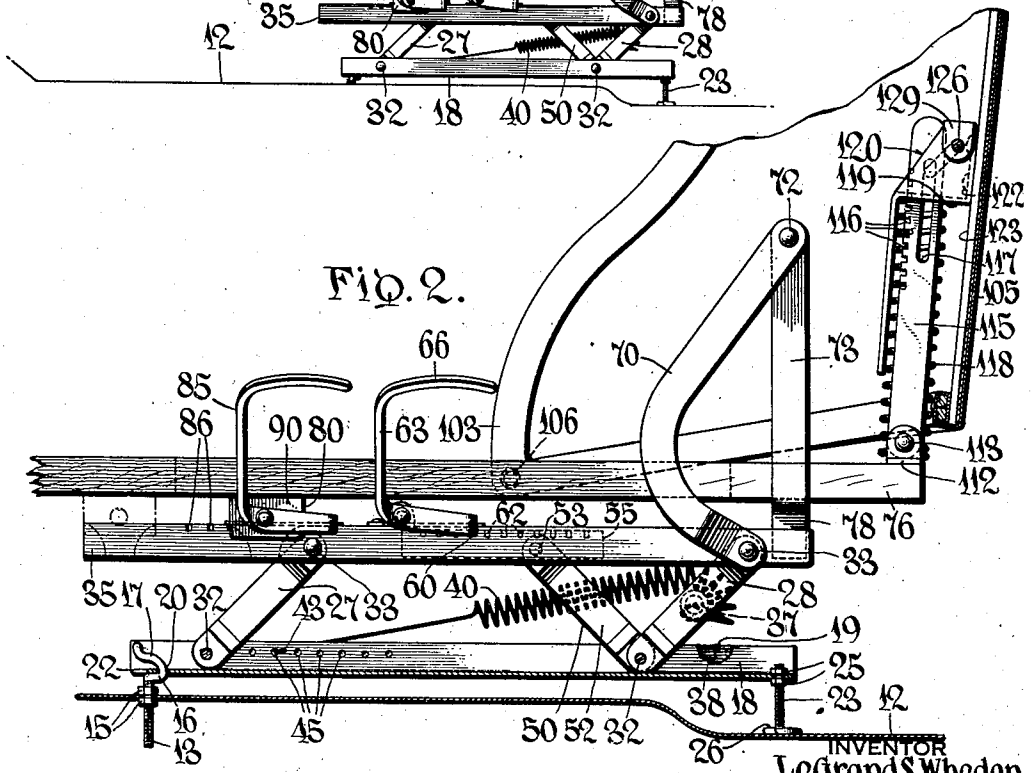


Fig. 2.



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Fig. 3.

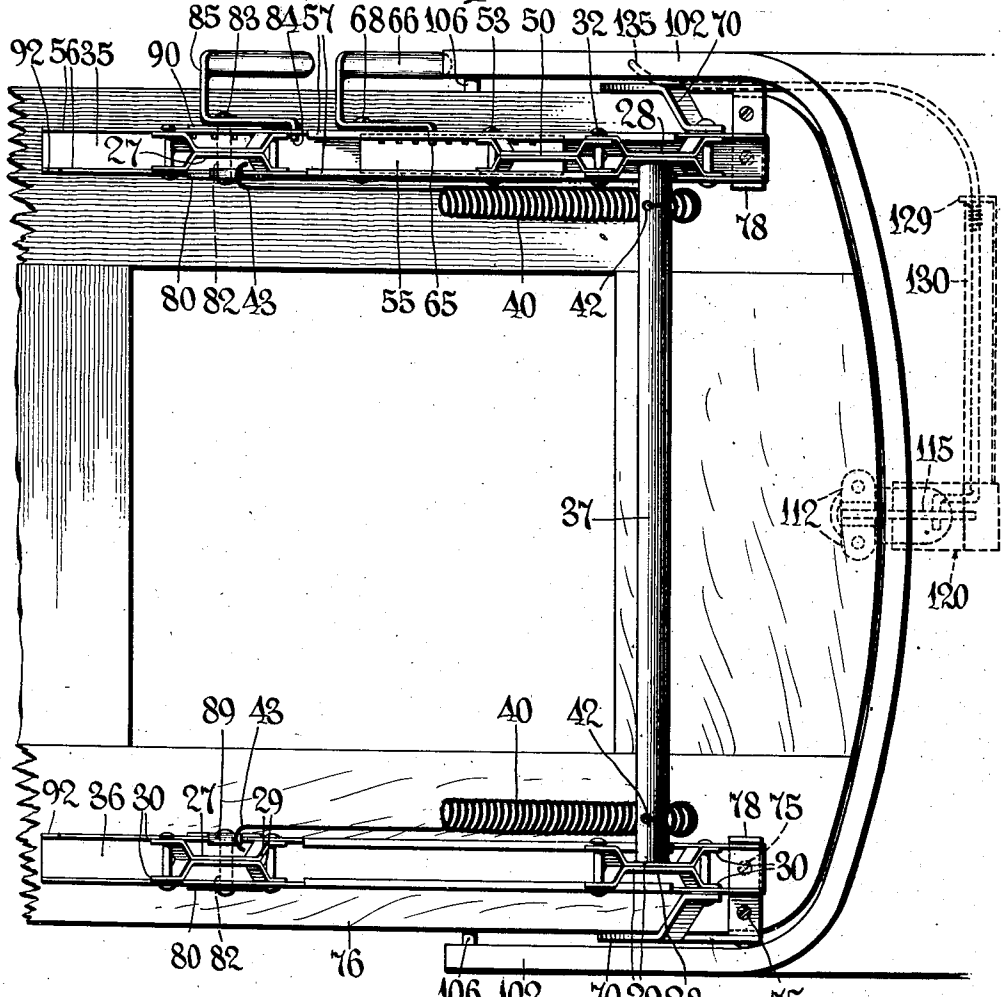


Fig. 5.

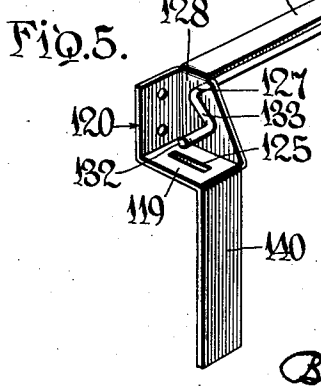
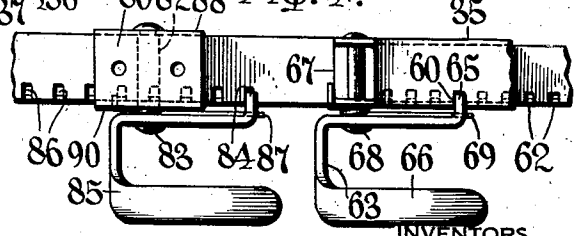


Fig. 4.



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Patented Aug. 24, 1937

2,091,088

UNITED STATES PATENT OFFICE

2,091,088

ADJUSTABLE SEAT MECHANISM

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Application August 1, 1935, Serial No. 34,272

3 Claims. (Cl. 155—14)

The invention relates to an adjustable seat installation for vehicles or other structures, and it has particular relation to an improved supporting and operating mechanism for a seating structure wherein seat supporting members, seat back and seat bottom can be relatively moved to conform readily to various positions desired by persons having various heights, weights, or other characteristics that might require either average or special seating arrangements.

The improved adjusting and supporting mechanism for adjustable seat structures to which the invention is directed involves an improvement over the type of seat structure wherein an occupant while seated may adjust the elements of the seating structure to provide comfortable upright seating posture for the back, or the seat may be so adjusted as to move the seat bottom with respect to its angular relation to the horizontal, in order to raise and lower portions thereof in conformity with the desired position or physical characteristics of various types of persons; or the seat bottom may be moved bodily to various horizontal positions forwardly and rearwardly, while portions of the seat back can be adjusted forwardly and rearwardly at will, in addition to the bodily movement that occurs along with the movement of the seat bottom.

One of the principal features of the invention is exemplified in an improved structure of a controlling mechanism that is incorporated in a seat raising or lifting device that includes elements for locking and unlocking the seat structure in any of its series of positions while the locking mechanism is substantially free from binding influences that might tend to interfere with uniform action of the mechanical parts of the structure.

Another feature of the invention resides in the arrangement of parallel links for supporting the seat in various horizontal positions, and the cooperation of these elements with a locking device and springs to assist in the adjustment of the seat.

Another feature of the invention is exemplified in the combination of a substantially forwardly and rearwardly movable portion of the seating structure with devices which are operated to raise or lower the seat within predetermined limits, and wherein mechanisms providing for these types of movements can be operated independently or concurrently as desired.

The invention is also concerned with an improved construction of controlling device for locking the seat back in various positions.

In the drawings:

Fig. 1 is a side elevation of a complete seat assembly in which the invention has been incorporated;

Fig. 2 is a fragmentary view, on a larger scale, partially in vertical section and partially in elevation, and illustrating the principal operating features of the invention;

Fig. 3 is a fragmentary bottom plan of the construction shown in Fig. 2, and with certain structural elements omitted for the sake of clearness;

Fig. 4 is a fragmentary plan of adjusting elements included in the invention; and

Fig. 5 is a perspective of a locking bracket for controlling the position of certain portions of the seat structure.

In practicing the invention a seat structure **10** is installed upon a suitable support **12**, which can be in the form of a vehicle floor, or the like, and is provided with upright supporting rods **13** extending through the floor. Conventional nuts **15** are threaded upon the lower portions of each rod **13** against the upper and lower surfaces of the floor to provide a rigid assembly, and the upper portion of each rod has a rearwardly bent horizontal section **16** which merges into an upwardly and forwardly inclined or bent portion **17** that extends forwardly slightly beyond the body or threaded portion of the rod.

The forward end portion of each of a pair of identical channels **18** and **19** is provided with an opening **20** through which the rod **13** is disposed, and such forward end portion rests upon the horizontal section **16** of the rod. A portion of each channel end is cut away, as indicated at **22**, in order to facilitate the forward and upward tilting motion of the channels about the supporting sections **16** as fulcrums.

In this arrangement, the channels are normally held against displacement from the rods **16**, but these channels can be disengaged by tilting the rear channel ends upwardly and by moving the forward ends bodily from the rods.

The rear portion of each channel is provided with a threaded rod **23** which serves as a supporting leg and extends through the channel end. Conventional nuts **25** threaded upon the rod against opposite surfaces of the channel provide for upward and downward adjustment of the rear end of each channel. The lower portion of each rod **23** is formed with a foot **26** that

rests upon the surface of the floor 12 for supporting the channel.

Each channel opens upwardly and receives adjacent opposite ends thereof front and rear links 27 and 28, which are composed of flat bars 29 (Fig. 3) of relatively thin material. Opposite ends of each link are spread apart to form pairs of fingers 30 and the lower fingers are secured by means of bolts 32 passing through them and through sides of the channels 18 and 19. The upper fingers 30 are secured by means of similar bolts 33 passing through them and through the sides of upper channels 35 and 36 which open downwardly and are parallel to the lower channels 18 and 19, respectively.

As best shown in Fig. 3, the rear links 28 are connected by a transverse brace 37 which is tubular in form and is rigidly secured to the inner bar portions or sections 29 of the links 28. Opposite ends of the brace are welded or otherwise secured to the opposed sections of links, or in openings in the latter on opposite sides of the seat structure to insure a rigid assembly of the rear links. Thus forces applied to one of the rear links 28 are transmitted to the other rear link. Sufficient clearance for movement of the brace is provided by forming a recess 38 in the inner flange side of each of the lower channels 18 and 19, and thus, when the links are moved toward a horizontal position the flanges do not interfere with proper adjustments.

One end of each of a plurality of tension springs 40 is connected in an opening 42 adjacent one end of the brace 37 and the other end of the spring is provided with a hook 43 that is connected in one of a plurality of openings 45 formed in the lower channels 18 and 19. It will be noted that the coiled end portion of each spring adjacent the brace 37 is wound about the brace and as the links 28 move upwardly, or in a counterclockwise direction about the bolts 32 as viewed in Fig. 2, the wound portion of the spring will be partially unwound from the brace and the tension on the spring is lessened. The tension of the spring can be varied by selective adjustment of the hook 43 in the openings 45.

In the upward and downward movement of the seat bottom, each link 28 pivots about the pin 32 through an angle of approximately 90 degrees, or slightly less, and hence, the brace 37 has a rotative action with the link through approximately the same angle. When each link 28 is in an upright or substantially vertical position a minimum portion of the end of the spring 40 is wound about the brace 37, and when the link is in a substantially horizontal position the maximum portion of the spring end is wound about the brace. In addition to the extent to which the spring 40 is tensioned by bodily movement of the brace 37 with the link 28, several more convolutions of the spring are wound about the brace as the link approaches a horizontal position. These several more spring convolutions are determined by those disposed within the space represented by approximately 90 degrees or one fourth of the distance about the circumference of the brace 37. Thus the spring offers a progressively increasing amount of resistance as each link 28 approaches a horizontal position. Conversely, as the seat bottom is raised by movement of each link 28 toward a vertical position, the spring pulls a maximum amount at the beginning of the upward movement and the amount of force exerted by the spring diminishes progressively as the links approach a vertical position.

An adjusting link 50 composed of flat bar pieces 52 is pivotally secured at its lower end by means of the bolt 32 that supports the rear link 28 in the lower channel 18 and the upper end is secured by means of a pivot pin 53 in a downwardly opening channel slide 55 which is slidable longitudinally in the upper channel 35 between the upper bolts 33. The downwardly extending walls 56 of the upper channel 35 are provided with inwardly turned guide flanges 57 which assist in guiding the slide 55 and normally maintain it against displacement from the channel. The link 50 is formed similarly to the front and rear links 27 and 28 previously described.

One of the upper corners of the channel 35 receiving the slide 55 has a notch or slot 60 cut therethrough and the channel slide has a series of notches or slots 62, any one of which can register with the notch 60, depending upon the position of the slide as it is moved longitudinally in the channel 35. A locking lever 63 of angular or bell crank form is provided with a finger 65 formed integrally at one end thereof for engaging in registering notches 60 and 62, and is also provided with a handle portion 66 for manual manipulation.

A bearing bracket 67 is rigidly secured upon the channel 35 and is provided with a pivot pin 68 upon which the locking lever is pivotally mounted at its elbow. A spring 69 connected to the pin 68 has one end extending through the finger 65 and its other end anchored behind the bracket 67. This spring constantly urges the finger 65 toward its position of engagement in the notches 60 and 62.

A passenger seated upon the structure 10 manipulates the handle 66 to release the adjusting slide 55 and if the seat is to be lowered, the weight of the passenger will force the seat downwardly until the links 27, 28 approach horizontal positions and the handle is then released. The finger 65 will automatically snap into registering notches 60, 62. The passenger can raise the seat upon the links 27 and 28 by partially arising and permitting the seat bottom to follow upwardly under the influence of the tension springs 40 while maintaining the finger 65 disengaged from the notches 60, 62. At the desired elevation the handle 66 is released and the slide 55 again is locked to maintain the channels 18, 19 and 35, 36 in rigid, locked relation.

One end of a suspension link 70 is connected to each rear upper bolt 33 at each side of the seating structure and the other or upper end of the suspension link has a pivotal connection 72 securing it to the upper end portion of an upright standard 73 that is rigidly mounted, as indicated at 75 (Fig. 3), upon the rear portion of a frame 76 of a seat bottom 77. Each link 70 is bowed forwardly adjacent its lower end and provides for forward and rear swinging movement of the seat bottom. Lower extensions or ends 78 of the standards project downwardly adjacent the inner sides of the upper channels 35 and 36 and constitute guides to prevent lateral displacement of the frame 76 with respect to the channels.

As best shown in Fig. 2, when the seat bottom is moved forwardly a greater portion of the link 70 is disposed substantially coextensively with the vertical standard 73, and hence, does not project to the rear of the standard at locations above the seat bottom frame in any position of the parts

of the structure. A conventional seat cushion 79 is mounted upon the frame 76.

Two U-shaped brackets 80 opening downwardly are secured to the bottom of the seat frame 76 at locations spaced from the front extremity thereof, and they carry transverse pins 83 supported in side walls of the brackets. These pins have headed ends 83 to maintain them against displacement and the intermediate pin portions provide bearing surfaces to support the front portion of the seat bottom in sliding relation upon the upper surfaces of the upper channels. A handle lever 85 of bell crank form is provided upon one end of one of the pins 83 for pivotal action thereon and one end of the lever is provided with a locking finger 84 normally engaging one of the notches 86 formed along the upper corner of the upper channel 35.

The pins 82 are supported upon the upper surfaces of the channels 35, 36 and in conjunction with the suspension links 70 provide for forward and rearward movement of the seat bottom 77 with respect to the channel members 35, 36. The locking finger 84 can be disengaged and re-engaged to permit this movement and to secure the members in adjusted positions. A spring 87 connected to the pin 83 has one end disposed through the finger 84 and its other end anchored upon the bracket 80. This spring always urges the finger toward its position of engagement with the notches 86.

One side wall extension 88 of each bracket 80 projects downwardly along the adjacent side of the channel 35 and is formed with an inwardly turned flange 89 which engages beneath the edge of the channel side and prevents the bracket from being displaced vertically from the channel. The other side wall 90 of the bracket lies in sliding relation against the adjacent side of the channel 35 and the two bracket sides 88 and 90 provide a guide for slidably receiving the front portion of each of the channels 35, 36. Front end portions of the lower sides of the channels 35, 36 are formed with lugs 92 which serve as stops to prevent the brackets 80 from slipping from the ends of the channels and the inwardly turned flanges 57 of the rear portions of the channels also serve as stops to limit rearward movement of the brackets upon the channels. Thus the seat bottom can be adjusted forwardly and rearwardly upon the channels 35, 36 and locked in various positions of adjustment by manipulating the lever 85 and exerting slight force upon the seat bottom in the direction desired. This movement can be accomplished by a passenger in the vehicle shifting his weight in the desired direction.

When the seat bottom moves forwardly and rearwardly upon the pins 82 and rear links 70, the pivotal connection 72 describes an arc, and hence, the rear portion of the seat bottom is also slightly inclined with reference to the supporting channels 35, 36 as the links and rollers move forwardly from the position indicated in Fig. 2. Sufficient play is provided in connecting the brackets 80 about the upper channels 35, 36 to prevent binding of the parts in assuming the position of inclination referred to. The extensions 79 also insure proper guided movement of the seat bottom in forward and rearward movements upon the rollers.

At the rear portion of the seat bottom 77, a frame or shell 100 composed of metal, or other durable material is formed with side flanges 102, forwardly projecting lower arms 103, and back 105. Suitable pivotal connections 106, carried by the seat frame 76 at locations intermediate the forward and rearward portions of the seat bottom pivotally support the forward ends of the arms 103 of the shell and provide for forward and rearward swinging action of the rear and upper portion of the shell along a forward and upward arc from the rear of the seat bottom. A cushion 107 which is included with the shell 100 as a part of a seat back 108, is mounted in the seat shell in a conventional manner. Thus the seat back is bodily movable within predetermined limits about the pivotal connections 106.

An adjusting device 110 for the seat back is provided with brackets 112 bolted to the rear upper portion of the seat bottom frame 76 and a pivotal bolt 113 mounted thereon pivotally supports an upright bar 115 that has notches 116 formed in the forward edge thereof. The upper portion of the bar also has a slot 117 extending longitudinally therein. A coil spring 118 normally under compression surrounds the bar 115 and has its lower end resting upon the brackets 112, while its upper end presses against the lower surface of a wall 119 that is a part of an angular bracket 120. Conventional fastening devices 122 secure the bracket to an intermediate back frame portion 123 of the shell 100. The upper end portion of the bar extends through a slot 125 formed in the wall 119 and any of the notches can be engaged with the front edge wall of the slot 125 to lock the bar to the bracket.

An actuating crank rod 126 rotatably mounted in an opening 127 of a flange 128 formed on the bracket 120, also rotatably extends through an ear 129 formed at an angle to an extension 130 that projects rigidly from the body of the bracket. A finger 132 of crank pin form is provided upon the end of a crank arm 133 of the rod and fits slidably into the slot 117 of the bar 115. A handle or lever portion 135 of the crank rod 126 is adapted to be pressed downwardly to rotate the latter in the bearing openings of the bracket and thus to release the notches 116 of the bar 115 from engagement with the bracket 120. One end portion of a spring 136 is connected, as indicated at 137, to the rod 126 and its other end is connected, as indicated at 138, to the bracket extension 130. This spring is normally under tension and constantly exerts force in a clockwise direction upon the rod 126, as viewed in Figs. 1 and 2, for the purpose of maintaining the notched portion of the bar locked with the slotted portion of the bracket 120, and urges the bar toward the locked position as soon as the handle 135 has been released after pressing the latter downwardly. A downwardly disposed shield 140 in flange form and extending integrally from the front edge of the wall 119 protects the coil spring from contact with the rear portion of the back cushion 107.

The coil spring 118 is sufficiently strong to exert considerable force upon the seat back 108 tending to pivot it in an upward direction about the connections 106, and this action facilitates adjustment of the seat back. However, this spring is not sufficiently strong to interfere with the movement of the seat back on its rearmost position by reasonable pressure because the weight of a passenger on the seat overcomes the force of the spring. Since the pivotal action of the seat back is provided about the connections at intermediate portions of the seat bottom 77, all portions of the seat back cushion 107, against which the passenger rests, are moved forwardly

or rearwardly, as the case may be, in addition to the changing of the angle of inclination of the seat back, and as well as materially changing the elevation of the upper end of the seat back. In the rearward position of the seat back, the rear portion of the seat bottom is disposed within the lower portion of the shell between the sides of the shell. The links 70 and standards 73 are disposed adjacent the inner sides of the extensions 103 and are, therefore, substantially obscured from view.

One of the important advantages of this structure resides in the fact that a passenger seated in the vehicle can adjust the seat back without moving from the seat merely by operating the handle or lever 135 and then by leaning backwardly or forwardly, depending upon the direction in which the adjustment is desired. After the crank pin 132 has been actuated in the slot in the upper end of the bar 115 to disengage the notched portion of the bar from the bracket 120, the coil spring 118 causes the seat back to follow the passenger as he leans forward to the desired position, i. e., when the passenger desires to have the back adjusted forwardly. Since the pivotal connections 106 are disposed medially of the seat bottom, the rear portion of the seat bottom and the lower portion of the seat back substantially contact each other without materially separating during the pivotal movement of the back.

These conditions of operation are advantageous because the proper relationship between seat back and seat bottom is retained regardless of the relative position of adjustment, and also, the appearance of the seat structure as a whole is not marred by excessive separation of the junction portions of the cushions 79 and 107, which separation would occur if the pivotal connections for the shell were located at the rear portion of the seat bottom.

In addition to the adjustment secured by the seat back structure just described, the forward and rearward adjustment provided by the suspension links 70 and pins 82 upon the upper channels 35, 36, together with the upward adjustment provided by the lifting links 27 and 28, insures the positioning of the seat back and seat bottom and the seating structure as a whole in any practical relationship conceivable. Although several phases of adjustment can be employed separately, each phase of adjustment can serve to modify the seating characteristics of the others.

Although only one form of the invention has been shown and described in detail, it will be apparent to those skilled in the art that the invention is not so limited, but that various changes can be made therein without departing from the spirit of the invention or from the scope of the appended claims.

We claim:

1. In an automobile seat construction a supporting base, a seat frame member upon which is mounted the seat proper, a hook member adjustably mounted in said supporting base adjustable for vertical movement relative to said supporting base, said hook member comprising an upwardly extending shaft formed at its upper end to provide extensions first, rearwardly, then upwardly, then forwardly, and then upwardly, said seat frame member being formed with an opening near its forward edge adapted to receive said hook, so that the seat may be placed in position upon said hook by first lowering the seat while in a horizontal position over the extreme upper end of the hook, then tilting the seat so that its rear edge is elevated to a position above the front edge and while in this position drawing the seat rearwardly so that the opening in said frame member guides and carries the frame member along and around the curves of the hook until the seat is returned to its normal horizontal position and the front edge of the supporting member rests upon the rearward extension of said hook.

2. In a seat supporting unit, a pair of downwardly opening upper channel members having forward and rearward extremities, means for supporting a seat bottom upon said channel members, a plurality of downwardly extending arms having their upper end portions pivotally mounted within the channels of said channel members, a lower channel member opening upwardly in opposed relation directly below each upper channel member, means for pivotally supporting the lower end portions of said arms within the lower channel members, a brace rigidly connecting an intermediate portion of each of a pair of the arms adjacent corresponding end portions of the channel members, and means for selectively adjusting the arms pivotally with respect to the channel members, said brace and a plurality of the sides of the channel members having interfitting portions to permit collapsing of the arms and channel members.

3. In a seat supporting unit, a pair of substantially parallel upwardly opening channel members, a plurality of upwardly extending arms having their lower end portions pivotally connected within forward and rearward portions of said channel members, an upper channel member opening downwardly directly above and movable substantially into lengthwise contacting relation with each lower channel member, means for pivotally connecting the upper end portions of said arms within the end portions of the upper channel members whereby the arms are substantially collapsible with and enclosed in the opposed channel members in their substantially contacting relation, and a brace rigidly connecting a pair of the arms adjacent corresponding end portions of the channel members in a direction transversely of the channel members, a plurality of the sides of said channel members being recessed to receive the brace in the collapsed relation of the channel members and arms.

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