March 19, 1940. C. L. HASLUP 2,194,120

SEAT CONSTRUCTION

Filed June 8, 1938 2 Sheets-Sheet 1

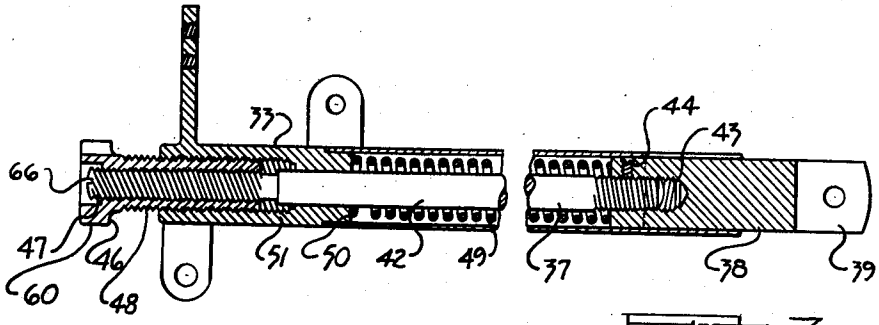



FIG 3

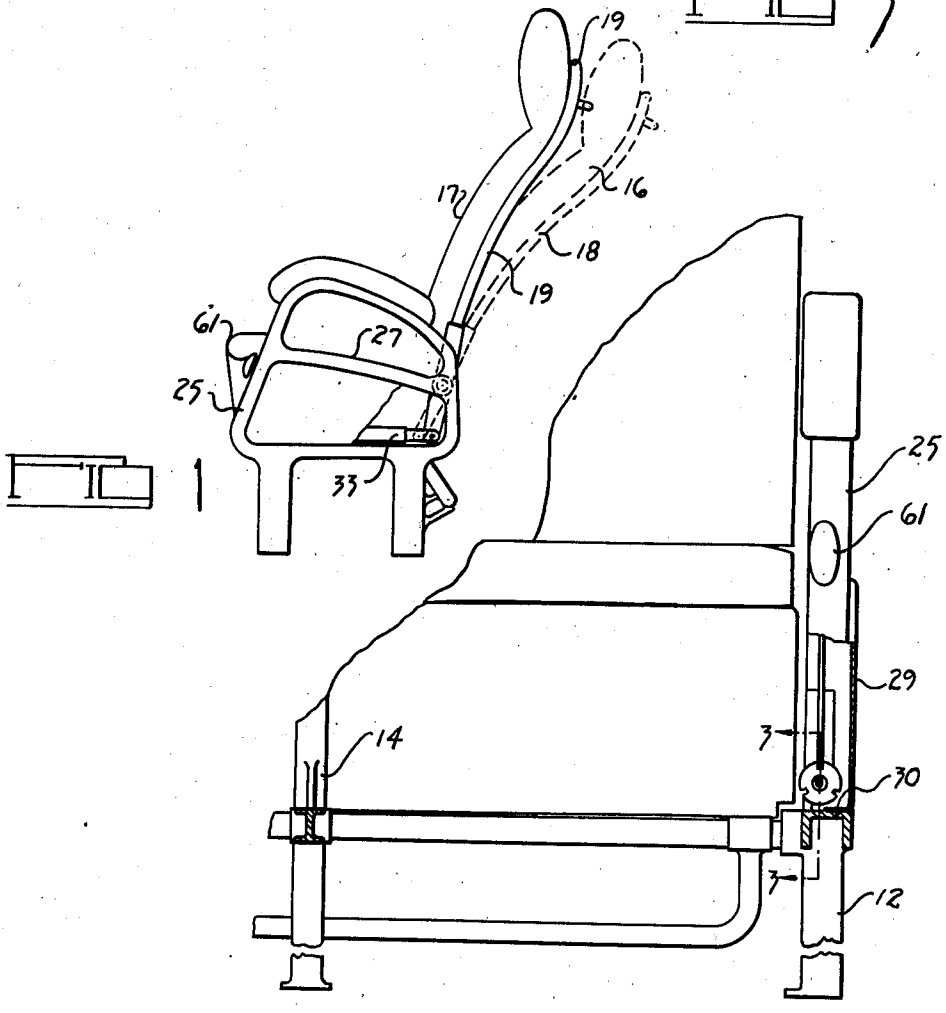



FIG 1

FIG 2

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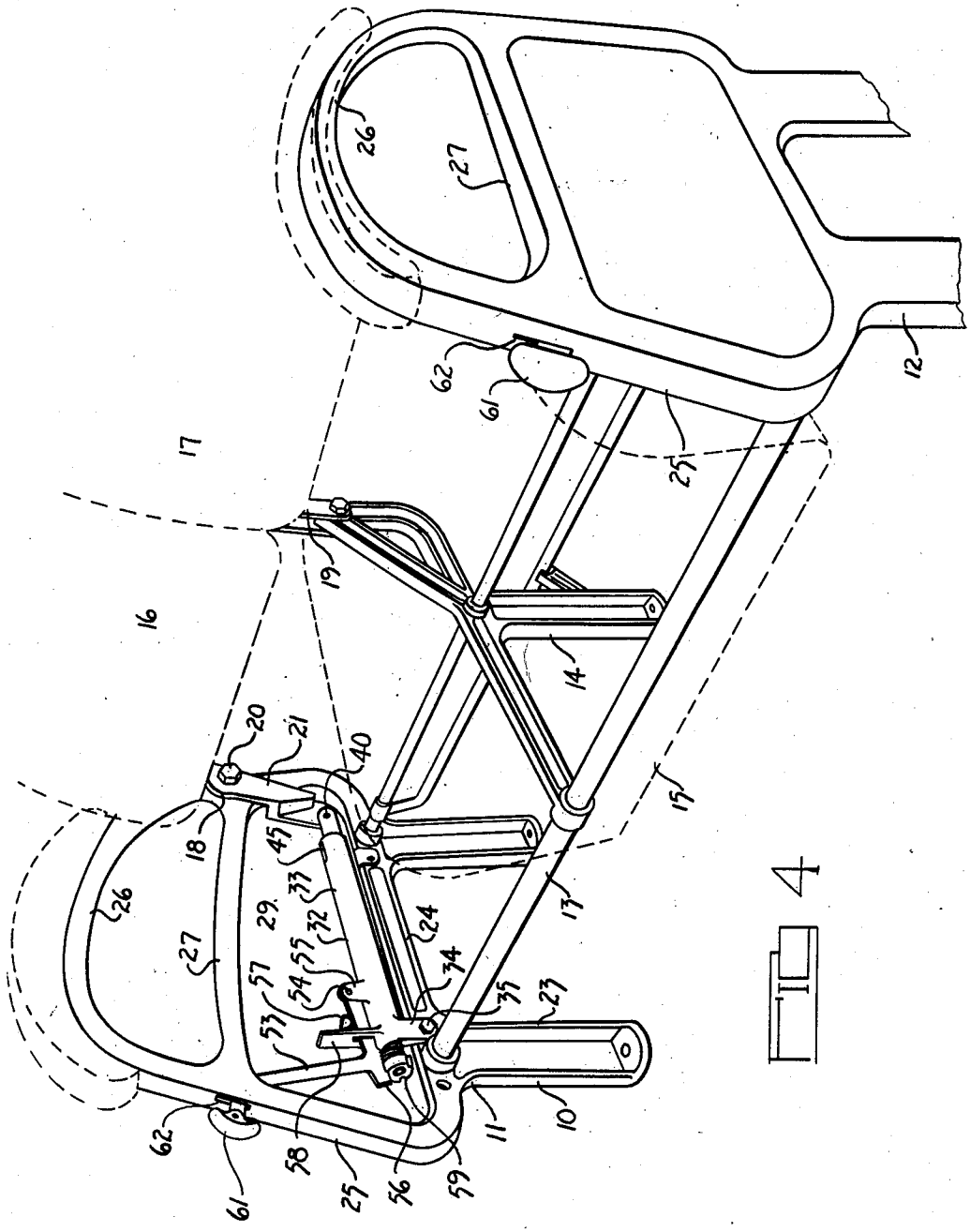



FIG. 4

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# UNITED STATES PATENT OFFICE

2,194,120

## SEAT CONSTRUCTION

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Application June 8, 1938, Serial No. 212,401

12 Claims. (Cl. 155—161)

This invention relates to seats having an adjustable supporting portion, and adjusting devices therefor.

One object of the invention is the provision of an adjusting device of simple construction for adjusting the positioning of a supporting portion such as the seat back or the like, enabling the seat portion to be readily adjusted by the occupant and to be readily locked and securely held in adjusted position.

Another object of the invention is the provision of an adjusting mechanism of the character mentioned incorporating an operating rod connected to the adjustable portion of a seat and connected to a carrying member by a releasably locked part which is differentially movable on the rod and on the carrying member, the part when locked determining the axial position of the operating rod and thus fixing the adjustable portion of the seat in adjusted position.

Other objects and advantages of the invention will be apparent from the following description, the appended claims, and the accompanying drawings in which:

Fig. 1 is a side elevation of an adjustable back seat embodying the present invention;

Fig. 2 is a front elevation of a portion of the seat, shown partly in vertical section;

Fig. 3 is a vertical sectional view through the adjusting mechanism taken on the line 3—3 of Fig. 2; and

Fig. 4 is a perspective view of the seat with one of the seat cushions removed.

Referring more particularly to the drawings, the numeral 10 generally designates the frame structure of a seat which may be of any suitable construction, but which as herein shown is a double seat such as could be used on buses or trains. The frame 10, as illustrated in Fig. 4, includes side frame members 11 and 12 rigidly interbraced and secured together by transversely extending connection tubes 13 which are connected at their centers to an intermediate support or leg structure. Two seat cushions 15, one of which is shown in Fig. 4, are removably carried by the tubes 13. Two back cushions 16 and 17 are supported on back frames 18 and 19 which are individually mounted on the side frames 11 and 12 and on the center leg 14 as by means of bolts 20 so as to swing to different angles of inclination on a horizontal axis. Projecting downwardly and fixed to the back frame 18 is an arm 21 which is connected, as will be presently described, to an adjusting mechanism, housed in the frame member 11, which enables the angle of inclination of the back to be readily determined by the occupant. A similar adjusting mechanism is provided in the frame member 12 for the back frame 19, it being understood that the two backs 18 and 19 are individually adjustable.

The side frame 11 is preferably formed of an aluminum casting providing the legs 23 and connecting bar 24, the upper portions of the frame preferably being rectangular tubes as shown at 25, curving from front to rear as shown at 26 to provide an arm rest pad support. Below the curved portion 26 is a middle tube 27, the space between the tube 27 and the lower bar 24 from the front to the rear of the frame being enclosed on the outer side by a sheet metal panel plate 29 having inwardly extending flanges that are detachably connected by suitable screws 30 to the frame structure. The side panel 29 encloses and protects the adjusting mechanism which is generally designated by the numeral 32.

The adjusting mechanism 32 comprises an elongated hollow or tubular member 33 which is supported substantially horizontally on the bar 24 of the seat frame. As shown, the tubular member 33 is provided with a downwardly extending lug 34 which is pivotally connected by means of the bolt 35 that extends through the bar 24, to permit some rocking movements of the tubular member on a horizontal axis so that the rear end of the tubular member may be raised or lowered somewhat as the back frame tilts.

Slidably mounted in the tubular member 33 is an operating member or rod 37. On the rear end of the rod 37 is a cast lug 38 having a bifurcated portion 39 which receives the lower end of the arm 21, a pivot pin 40 interconnecting these two parts so that as the arm 21 rocks on the bolt 20, the rod 37 is moved longitudinally in the tubular member 33. The bifurcated portion 39 holds the rod against rotation on its own axis. Connected to the cast lug 38 is a stud 42 which forms the body portion of the rod 37, the stud being in threaded engagement with the lug as indicated at 43, set screw 44 threaded in the lug 38 and engaging the threads on the stud 42 normally fixing these two parts against relative movement but permitting the proper initial setting of the parts when the mechanism is attached to the seat frame and the arm 21. The head of the screw 44 is accessible through a slot 45 provided in the upper side of the tubular member and so arranged as to expose the head of the screw 44 when the rod 37 is moved to its extreme rear position.

The forward end of the stud 42 is engaged with a part 46 which is differentially connected to the stud and to the tubular member 33 so that part 46 will be moved in the tubular member as the rod moves axially. The differential connection between the part 46 and the members 33 and 37, as shown, comprises multiple threads of comparatively large lead so that the part 46 can readily be turned and axially moved in the tubular member 33 as the rod moves endwise. The threads 47 on the end of the rod 37, which is preferably about one-half inch in diameter, may be quadruple threads with about two turns per inch, cut right-hand, so that a one inch relative axial movement of the rod 37 will produce two complete turns of the part 46. The external threads 48 on the part 46 are left-hand threads cut quadruple with two threads per inch so that two complete turns of the part 46 in the tubular member will advance the part 46 one inch. With this long thread lead, about equal in length to the thread diameter, the part 46 is readily rotated by the rod 37 as the latter moves axially, but since the threads on the inside and outside surfaces of the part 46 are oppositely directed, one right-hand and one left-hand, a much smaller axial movement of the part 46 is produced than the axial movement of the rod 37. With the particular arrangement of threads as described above, it will be apparent that one inch travel of the rod 37 will produce a one-half inch axial shifting of the part 46. With a lead of about a half inch and with multiple threads on the part 46 there will be no substantial lost motion or play of the rod 37 when the part 46 is held against rotation, but when the part 46 is free to rotate, the occupant of the seat, merely by pushing back against the adjustable back 18, may readily force the rod 37 in a forward direction against the action of the spring 49 which is coiled around the rod 37 and engaged at one end with the lug 38 and at the other end with the abutment 50 formed on the cast portion 51 which is welded to the forward end of the tube that forms the rear portion of the tubular member 33. This forward movement of the rod 37 thus rotates the part 46, and when the desired angle of inclination of the adjustable back is attained, the occupant then locks the part 46 against rotation so as to definitely determine the axial position of the rod 37 and fix the back in position.

The locking of the part 46 is accomplished by means of a locking device including a lever 53 which is pivotally supported by a pin 54 on upwardly projecting arms 55 carried by the top of the tubular member 33. The forwardly projecting portion 56 of the locking lever is normally urged downwardly by means of a leaf spring 57 one end of which is secured to the strap 58 welded to the tubular member 33, the spring 57 normally holding the forward end of the lever yieldingly into one of the notches 59 provided in the peripheral surface 60 of the part 46 which is located beyond the end of the tubular member 33. As herein shown three such notches are provided, spaced apart about 120° to provide several different positions of adjustment in which the back may be secured. The part 46 may readily be released by a person while occupying the seat, by pulling upwardly on the hand knob 61, carried by the upper end of the lever 53 which projects through a slot 62 in the seat frame so that the knob 61 will be carried in a convenient position at the front of the frame below the arm rest.

As will be understood, the adjusting mechanism is a unitary assemblage which may be readily mounted by a single pivot bolt 35 on the seat frame, and the rear end of the rod 37 may be connected readily by a single pivot stud to the lower end of the arm 21, the assemblage being positioned at the side of the seat cushion where it is protected by the cushion, while protection is afforded on the outer side by the panel 29, the only visible or exposed portion of the structure being the hand knob 61. The spring 49 normally urges the rod 37 rearwardly so as to tilt the back in a forward direction when the weight of the occupant is not applied to the back and when the latch 56 is free from the part 46. By pushing rearwardly on the seat back, with the hand knob 61 raised, the desired angle of inclination can be obtained and the back then held in the desired position by merely releasing the knob 61.

Since the connection between the adjustable portion of the seat, and the stationary support or frame is maintained by a differential frictional connection during the adjusting movements of the adjustable portion, the adjustable portion will not move suddenly with a sudden bump against some stop, but will have a controlled frictional resistance which prevents any such instantaneous or sudden operating movements.

The length of the latching portion 56 of the holding device is sufficient so that it may properly engage in any of the notches in the part 46 throughout the axial travel of that part, the initial position of the part 46 being determined, when the apparatus is assembled, by screwing the end of the stud 42 into or out of the cast lug 38 so that the end of the external threads on the part 46 will be spaced only a little distance from the end of the tubular member 33 when the seat back is in its forward limiting position.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a seat of the character described, a seat frame, a seat on said frame, a back hinged to said frame for pivotal movement about a horizontal axis, an elongated member mounted on said frame, an operating rod pivotally connected adjacent one end thereof to said back and slidably connected to said member, means arranged coaxially with said rod and supported on said member for rotational movements, said rod and means having cooperating interfitting portions for rotating said means when said rod is moved axially, and a locking device accessible to a person on said seat for locking said means against rotation to determine the position of said back.

2. In a seat of the character described, a seat frame, a seat on said frame, a back hinged to said frame for pivotal movement about a horizontal axis, a rod supporting member mounted on said frame, an operating rod slidably connected to said member, a connection between said rod and said back, means threaded on said rod and rotatably connected to said member and rotatably movable by said rod when said rod is moved axially, a spring urging said rod in one direction, and a locking device accessible to a person on said seat for locking said means against rotation to determine the position of said back.

3. In a seat of the character described, a seat

frame, a seat on said frame, a back hinged to said frame for pivotal movement about a horizontal axis and having an arm projecting below said axis, a tubular member pivotally connected to said frame at one side of the seat for movement about a horizontal axis, an operating rod pivotally connected at one end to said arm and slidably supported in said member, a part concentric with said member and rod, said part having a differential connection to said member and to said rod and operated by said rod to shift in said member and to move relatively to said rod, and a locking device accessible to a person on the seat for locking said part against movement with respect to said member to determine the position of said back.

4. In a seat of the character described, a seat frame, a seat on said frame, a back hinged to said frame for pivotal movement about a horizontal axis and having an arm projecting below said axis, a tubular member pivotally connected to said frame at one side of the seat for movement about a horizontal axis, an operating rod slidably supported in said member and having a lug adjustably mounted thereon pivotally connected to said arm and held against rotation thereby, a part concentric with said member and rod and having a differential connection to said member and to said rod and operated by said rod to shift axially in said member and to move relatively to said rod, and a locking device accessible to a person on the seat for engaging and locking said part against movement with respect to said member to determine the position of said back.

5. A mechanism of the character described comprising an elongated tubular member adapted to be supported substantially horizontally on a seat frame, an operating means slidable in said member and adapted for pivotal connection to a seat back, a threaded part in threaded engagement with said means and rotatably mounted in said member to rotate in said member when said means is moved axially, spring means normally urging said means in one direction, and a lock for releasably locking said part against rotation to determine the position of said means.

6. A mechanism of the character described comprising an elongated tubular member adapted to be supported substantially horizontally on a seat frame, an operating rod mounted for sliding movement in said member and adapted for pivotal connection to a seat back, external threads on said rod, an internally threaded part in threaded engagement with said rod and mounted to rotate in said member when said rod is moved axially, external threads on said part of opposite pitch with respect to the threads on said rod and in threaded engagement with said member causing axial movement of said part in the direction of rod movement when the rod is moved in said part to rotate the same, spring means normally urging said rod in one direction, and means for releasably locking said part against rotation to determine the position of said rod.

7. A mechanism of the character described comprising a tubular member adapted to be supported substantially horizontally on a seat frame, an operating rod slidable in said member and adapted for connection to a seat back, spring means for normally urging said rod in one direction, a part having a differential engagement with said rod and said member and mounted for rotational and axial movements relative thereto, and means for releasably locking said part to determine the position of said rod.

8. A mechanism of the character described comprising a tubular member adapted to be supported substantially horizontally on a seat frame, an operating rod slidable in said member and adapted for connection to a seat back, a coil spring in said member and around said rod for normally urging said rod in one direction, a part having a differential engagement with said rod and said member and mounted for rotational and axial movements relative thereto, a locking lever pivoted on said member for releasably locking said part to determine the position of said rod, and a spring urging said lever into locking position.

9. A seat reclining mechanism of the character described comprising a tubular member, an operating rod slidable axially in said member, spring means in said member and around said rod for normally urging said rod in one direction, a part in threaded engagement with said member and reversely threaded on said rod and movable rotatably and axially in said member by axial movements of said rod, said part having a notched peripheral portion, and means selectively engageable in the notches in said part to hold said rod against rotation and thereby determine the axial positioning of said rod.

10. A mechanism of the character described comprising a tubular member having a lug projecting laterally therefrom, means for pivotally supporting said lug, an operating rod slidably supported in said member, spring means in said member engaging said rod and normally urging said rod in one direction, a rotatable part supported by said member at one end thereof, said part having a differential connection with said rod and said member to move axially in said member when the rod is moved axially in said part, and a locking lever pivoted on said member and releasably engageable with said part to hold the same against movement in said member and thus determine the position of said rod.

11. An adjusting mechanism for a movable supporting portion of a seat comprising a plurality of coaxial members one having a connection to the supporting portion and another having a connection to a fixed support, means providing a threaded interconnection between said members and causing rotation of one of said members by an axial force applied to the first-named member by pressure of the occupant against the supporting portion of the seat, spring means yieldingly opposing said axial force, and releasable means for holding the rotatable member against rotation.

12. An adjusting mechanism for a movable supporting portion of a seat comprising a pair of elongated coaxial members having connections respectively to the supporting portion and a fixed support, means preventing relative rotational movements of said members about their common axis, threads on said members, and a third rotatable member coaxial with said first two members and having two sets of threads respectively engaging the threads on said first two members, said threads causing rotation of said third member by an axial force applied to one of said members by pressure of the occupant against the supporting portion of the seat, spring means yieldingly opposing said axial force, and releasable means operable to hold said third member against rotation.

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