

Sept. 6, 1966

P. C. TABOR

3,271,071

POSITION ADJUSTERS FOR SEAT BACKS

Filed June 22, 1964

2 Sheets-Sheet 1

FIG. 1

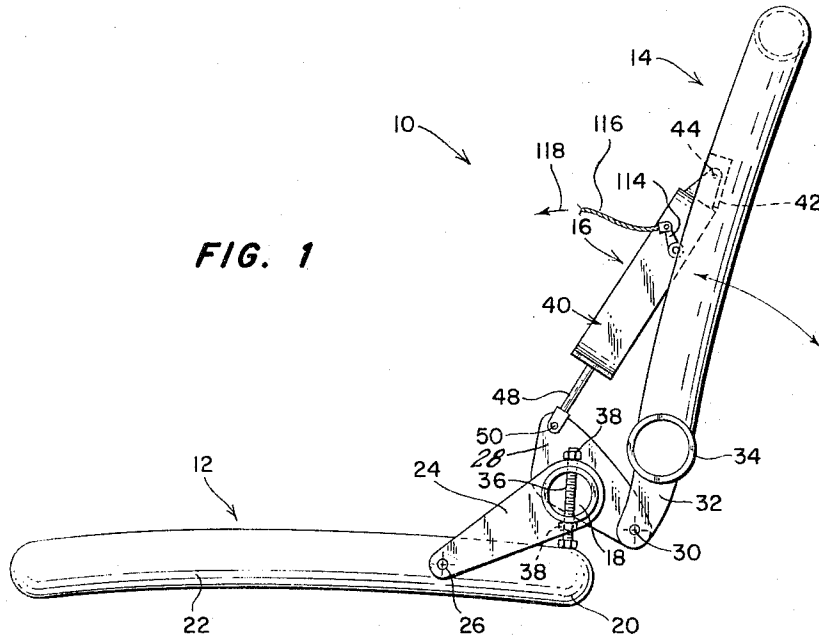
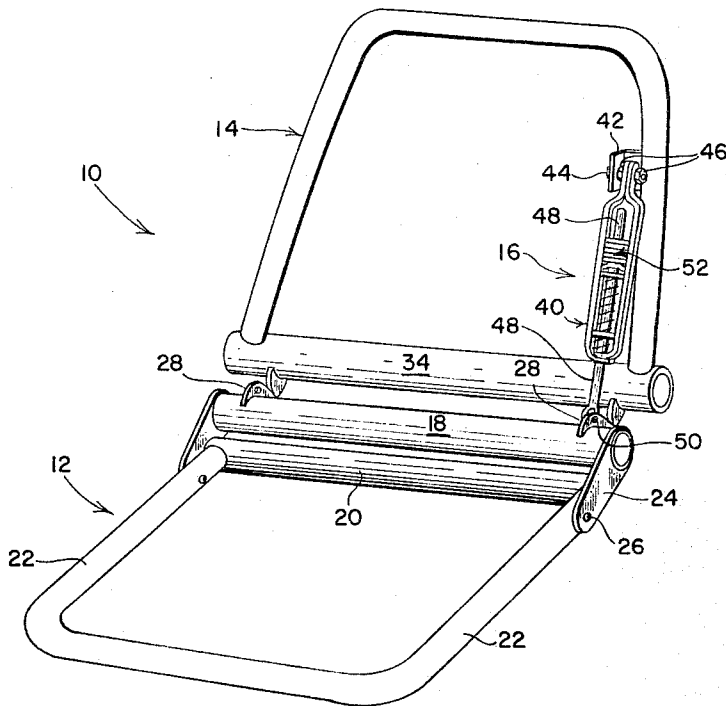


FIG. 2

INVENTOR

PAUL C. TABOR

BY

Strauch, Nolan & Neale
ATTORNEYS

Sept. 6, 1966

P. C. TABOR

3,271,071

POSITION ADJUSTERS FOR SEAT BACKS

Filed June 22, 1964

2 Sheets-Sheet 2

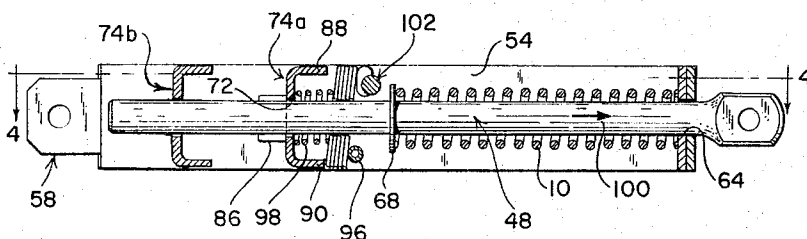


FIG. 3

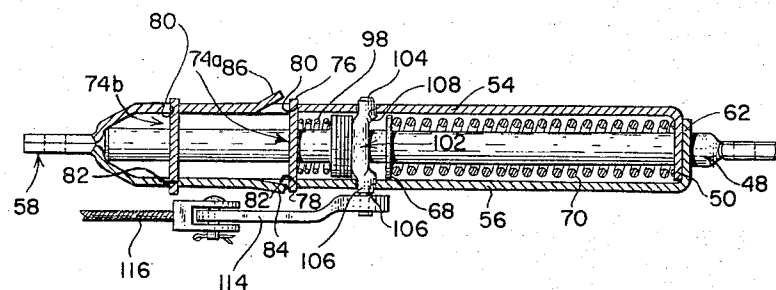


FIG. 4

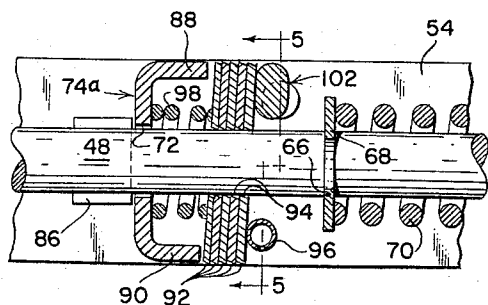


FIG. 6

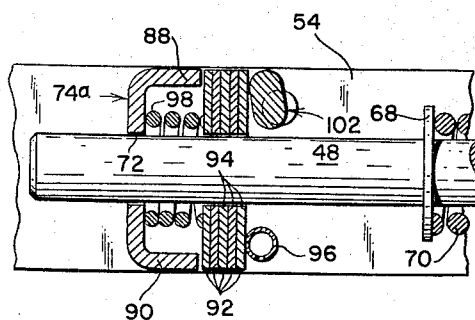


FIG. 7

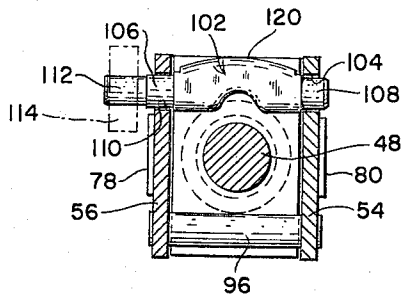


FIG. 5

INVENTOR.

PAUL C. TABOR

BY

Strauch, Nolan & Neale

ATTORNEYS

1

2

3,271,071

POSITION ADJUSTERS FOR SEAT BACKS

Paul C. Tabor, Clawson, Mich., assignor, by mesne assignments, to Rockwell-Standard Corporation, a corporation of Delaware

Filed June 22, 1964, Ser. No. 376,775

4 Claims. (Cl. 297—375)

This invention relates to seats with reclining backs and, more specifically, to novel position adjusters capable of positioning the backs of such seats in an infinite number of inclined positions.

Position adjusters for reclining seat backs are well known and are widely employed in automobiles, buses, and the like. The majority of the heretofore available position adjusters are equipped with ratchet and pawl mechanisms which provide a limited number of adjusted positions depending upon the number and spacing of the teeth on the ratchet. Such position adjusters, in addition to having only a small number of adjusted positions which cannot be altered by the user, are noisy and subject to rapid wear. A need has, therefore, long existed for position adjusters having a wider range of adjustment, quieter operation, and a longer service life.

One attempt to satisfy this need entails the use of a hydraulic piston and cylinder arrangement which has proved too expensive to be commercially feasible particularly because of requirements for preventing leakage of the hydraulic fluid. Other proposals, including an extensible rod arrangement which is selectively locked or released by movement of a tiltable washer construction, have in general lacked the necessary compactness, lightweight, dependability and low cost which are necessary to satisfy the requirements of commercially practical applications.

It is an important object of the present invention to provide novel improved position adjusters which do not have the above-discussed disadvantages of those heretofore known.

In its preferred embodiment, the novel position adjuster provided by the present invention for accomplishing the foregoing object includes an elongated housing, an extensible tension member mounted in and protruding from the housing, and a plurality of wobble type locking plates which surround and are normally tilted against the tension member and prevent it from being extended relative to the housing. A lever operated cam permits the locking plates to be tilted from the normal locking position about a fulcrum pin to free the tension member for movement relative to the housing.

The housing and tension member are attached to the seat portion and seat back of the seat with which the position adjuster is employed. Consequently, by varying the extension of the tension member from the housing in the manner described above, the seat back can be positioned in any one of an infinite number of positions relative to the seat portion within a wide range of adjustment. Moreover, these novel position adjusters operate noiselessly, are substantially less subject to wear than those of the ratchet and pawl type or the type shown in the Brandoli patent, and are much cheaper to manufacture than the Brandoli position adjuster would be.

From the foregoing it will be apparent other objects of the present invention include the provision of novel position adjusters for reclining seat backs which:

- (1) Are capable of positioning the seat back in an infinite number of positions relative to the seat portion;
- (2) Operate noiselessly;
- (3) Are less susceptible to wear than those heretofore available;
- (4) Are simple and relatively inexpensive to manufacture; and
- (5) Positively prevent movement of the seat back away

from the seat portion (i.e., in the reclined direction), but merely brake movement of the seat toward the seat portion, permitting the seat to be adjusted in this direction without releasing the position adjuster's locking mechanism.

Another important object of the present invention is the provision of seats having a seat portion, a reclining back, and a position adjuster for positioning the seat back in any of an infinite number of tilted positions relative to the seat portion.

Additional objects and further novel features of the present invention will become more fully apparent from the appended claims and as the ensuing detailed description and discussion proceeds in conjunction with the accompanying drawing, in which:

FIGURE 1 is a side view of the frame of a reclining back automobile seat of the bucket type provided with a position adjuster fabricated in accord with the principles of the present invention;

FIGURE 2 is a perspective view of the seat frame and position adjuster of FIGURE 1;

FIGURE 3 is a longitudinal section through the position adjuster;

FIGURE 4 is a top view of the position adjuster;

FIGURE 5 is a transverse section through the position adjuster, taken substantially along line 5—5 of FIGURE 6, and illustrates the shape of the release cam provided to unlock the position adjuster and permit adjustment of the reclining seat back;

FIGURE 6 is a fragment of FIGURE 3 to an enlarged scale, showing the position adjuster locking mechanism in its locked condition; and

FIGURE 7 is a view similar to FIGURE 6, but with the locking mechanism released.

Referring now to the drawing, FIGURE 1 illustrates an automobile seat frame 10 of the bucket type including a seat portion 12 and a back 14, and a position adjuster 16 constructed in accordance with the principles of the present invention for adjusting back frame 14 in any of an infinite number of inclined or tilted positions relative to seat portion frame 12.

Seat frame 10 is of tubular construction and includes, in addition to the frame 12 of the seat portion and frame 14 of the seat back, a transversely extending rail 18 which overlies rear rail 20 of frame 12 and is pivotally attached to the side rails 22 of frame 12 by brackets 24 and pivot members 26 which may be bolts, studs, or the like.

As is best shown in FIGURE 1, brackets 28 welded to rail 18 are connected by pivot pins 30 to cooperating brackets 32 fixed as by welding to the lower rail 34 of seat back frame 14, mounting seat back frame 14 for pivotal movement relative to frame 12 of the seat portion. The height of seat back frame 14 relative to frame 12 may be varied by adjustable stops 36 which engage rear rail 20 of frame 12 and are fixed to rail 18 by nuts 38.

The use of an intermediate rail to mount seat back frame 14 permits the seat back to be folded against seat portion frame 12 without disturbing the relative positioning between these components provided by position adjuster 16.

The foregoing and other details are not important as far as the present invention is concerned and may be varied as desired as will shortly become apparent.

Referring still to FIGURES 1 and 2, the novel position adjuster 16 by which the inclination of seat back frame 14 is varied includes a housing 40 pivotally connected to a bracket 42 fixed to seat back frame 14 by bolt 44 and nuts 46 and a tension member or rod 48 pivotally connected to one of the two brackets 28 on rail 18 as by pivot pin 50. Tension member 48 is slidably guided in and protrudes from housing 40. A locking mechanism identified generally by reference character 52 and housed

in adjuster housing 40 prevents extension of tension member 48 relative to the housing so that, with the locking mechanism in its normal locked condition, housing 40 and tension member 48 act as a single inextensible link, maintaining seat back frame 14 at the desired inclination relative to seat portion frame 12.

With further reference now to FIGURES 3 to 5, the adjuster housing 40 is comprised of two substantially identical flat rectangular side stampings 54 and 56 positioned opposite each other in mirror image relationship to provide a housing having side walls and an open top and bottom. At one end of the housing side stampings 54 and 56 converge and meet in abutting relation to form the flange 58 fixed by bolt 44 to bracket 42. Stampings 54 and 56 are secured together as by welding to form a closure at this end of the housing. At the opposite end of housing 40, stampings 54 and 56 are bent inwardly at right angles to form closure portions 60 and 62 which overlap each other and are welded or otherwise secured together.

Tension member or rod 48 of the adjusting mechanism extends into housing 40 through aligned apertures 64 in closure portions 60 and 62 and is provided intermediate its ends with a groove 66 (FIGURE 6) which receives a retainer ring 68. Interposed between retainer ring 68 and closure portion 60 is a coil spring 70 which surrounds tension member 48 and continuously urges it inwardly of housing 40, i.e., toward flange 58 at the opposite end of the housing.

The end of tension member 48 on the side of retainer ring 68 opposite spring 70 extends through apertures 72 in guide plates 74a and 74b which are mounted in housing 40 to keep rod 48 axially aligned relative to the housing and to reinforce the housing so that it will not collapse under load. The apertures 72 in guide plates 74a and 74b and apertures 64 in housing closure parts 60 and 62 are coaxial.

Guide plates 74a and 74b are fixed in housing 40 by tabs 76 and 78 extending from the guide plate through rectangular apertures 80 and 82 in side stampings 54 and 56. After assembly of guide plate 74a in housing 40, tangs 84 and 86, stamped from housing side members 54 and 56, are bent as shown at the bottom of FIGURE 4 to assure a tight interlocking fit of tabs 76 and 78 with the side stampings 54 and 56 and rigid connections between the guide plate 74a and the housing.

Guide plate 74a is provided with top and bottom flanges 88 and 90 which extend normally from the main portion of the guide plate toward the retainer ring 68 on rod 48. Abutting the end of lower flange 90 and surrounding tension member 48 are a number (five in the illustrated embodiment) of rectangular lock plates 92 of the wobble plate type which are part of the locking mechanism 52 and which, when tilted into engagement with rod 48, lock it against longitudinal movement relative to housing 40 in a direction away from guide plate 74a. Lock plates 92 have central apertures 94 which are slightly larger than the diameter of tension member 48 and allow the lock plates to be tilted against the tension member and a square external configuration which cooperates with side stampings 54 and 56 to prevent them from rotating in housing 40.

On the other side of lock plates 92 opposite but slightly higher than lower flange 90 is a fulcrum pin 96 which extends across housing 40 and is secured in side stampings 54 and 56. Pin 96 provides the fulcrum point around which lock plates are tilted into engagement with tension member 48.

Lock plates 92 are tilted around fulcrum pin 96 by a coil spring 98 extending between guide plate 74a and lock plates 92 and surrounding tension member 48. Coil spring 98 biases lock plates 92 toward retainer disc 68; and, as coil spring 98 exerts its entire force on lock plates 92 at points above fulcrum pin 96, it pivots the lock plates in a clockwise direction about the fulcrum pin into

engagement with the tension member. This causes the edges of lock plate apertures 94 to bite into tension member 48, thus locking it against longitudinal movement relative to housing 40 in a direction away from guide plate 74a.

Exertion of a load on seat back frame 14 tends to move tension member 48 in the direction shown by arrow 100 in FIGURE 3. This tends to tilt lock plates 92 even further in a clockwise direction about fulcrum pin 96. Consequently the aperture edges exert a high unit load on tension member 48. This load, multiplied by the coefficient of friction between the lock plates and tension member 48 produces a high frictional force between the axially fixed lock plates and the tension member, which positively locks the latter against extension from housing 40.

The locking arrangement just described does not positively lock tension member 48 against movement toward guide plate 74a which is advantageous in that it permits seat back frame 14 to be adjusted forwardly (i.e., toward seat portion frame 12) without releasing the locking mechanism. However, the locking mechanism does exert a sufficient braking resistance against movement of tension member 48 in this direction that the seat back will not be swung forward by sudden stops or the like.

The force which spring 98 exerts to lock rod 48 against movement by an axial force acting on the rod (for example, the weight of a person's back on seat back frame 14) may be altered by changing the design of spring 98 which is compressed in the assembly process by the bending of tangs 84 and 86 to the position shown at the bottom of FIGURE 4. This moves guide plate 74a toward lock plates 92, thus shortening spring 98, which bears against the normally axially immovable lock plates.

Tension member 48 is freed for movement relative to housing 40 to permit adjustment of seat back frame 14 by tilting lock plates 92 in a counterclockwise direction about fulcrum pin 96 until they are perpendicular to the tension member (see FIGURE 7). Since the apertures 94 in the lock plates are larger in diameter than the tension member, this permits free movement of the tension member relative to the housing. Lock plates 92 are tilted to this position against the bias of spring 98 by a cam member 102 which extends across housing 40 and is rotatably supported by cam member journals 104 and 106 which extend through apertures 108 and 110 in side stampings 54 and 56. Journal 104 terminates in a squared end 112 to which an operating lever 114 is attached. In the embodiment of the invention shown in FIGURE 1, lever 114 is rocked by a pull wire 116 fixed to its free end.

With reference now to FIGURES 6 and 7, if it is desired to adjust seat back frame 14 away from seat portion frame 12 (i.e., rotate frame 14 clockwise as shown in FIGURES 1 and 2, pull wire 116 is pulled in the direction shown by arrow 118 in FIGURE 1. This rotates operating lever 114 and cam member 102 counterclockwise, causing cam 120 of the cam member to exert a force on the lower part of the lock plates 92. This rotates the lock plates counterclockwise against the force of spring 98, forcing them into a position normal to tension member 48. This brings the apertures 94 of the lock plates into axial alignment with rod or tension member 48; and, as the apertures are slightly larger than the diameter of the tension member, the latter is free to move longitudinally relative to housing 40, permitting seat back frame 14 to be adjusted to the desired position. When pull wire 116 is released, spring 98 immediately rotates cam member 102 clockwise from the position of FIGURE 7 to that of FIGURE 6 and tilts lock plates 92 into engagement with tension member 48, thus locking seat back frame 14 in the adjusted position.

Seat back frame 14 can also be adjusted in a counterclockwise or forward direction in the manner just described, if desired. Alternatively, the seat back frame can be adjusted in this direction by merely grasping it

5

6

and pulling it in a counterclockwise direction against the braking force exerted by the locking mechanism.

Although the principles of the present invention have been discussed particularly as applied to automobile seats, it will be apparent to one skilled in the art that they are by no means so limited in application. For example, it will be readily apparent that they are directly applicable to other kinds of reclining seats such as those employed in airplanes, buses, and passenger type railroad cars, for example. They are also directly applicable to reclining chairs and the like. The word seat, as used in the claims of this application, is therefore to be understood as being employed in a generic sense to encompass the foregoing and other types of seating devices employing the present invention.

Also, it is not necessary that housing 40 of position adjuster 16 be connected to seat back frame 14 as illustrated. The position adjuster will work equally well with housing member 40 connected to the seat portion and tension member 48 connected to the seat back.

The present invention may be embodied in other forms without departing from the spirit and essential characteristics thereof. Therefore, the present embodiments are to be considered in all respects as illustrative only, the scope of the invention being indicated by the appended claims rather than by the foregoing description.

I claim:

1. In a seat assembly having a relatively fixed seat member and a back member mounted on said seat member for pivotal movement between an inclined position and an upright position; means for adjusting the position of said back member comprising an extendable and contractable connector assembly pivotally secured at its opposite ends to said seat member and said back member respectively, and arranged to be extended when said back member is moved to said inclined position, said connector assembly comprising a housing connected to one of said members, a rod slidably received in said housing and connected to the other member, an operating spring wholly within said housing biasing said connector assembly to its contracted position, a plurality of juxtaposed centrally apertured lock plates carried by said housing, said rod extending through the apertures therein,

and said apertures being larger than said rod whereby said lock plates can be tilted relative to said rod, a fixed fulcrum rigid with said housing for preventing the movement of said lock plates toward the end of said housing from which the rod protrudes, said fulcrum being offset to one side of the axis of said rod, a locking spring encircling said rod and compressed between a fixed housing part and the side of said lock plates remote from said fulcrum, said spring being operative to tilt said lock plates around said fulcrum to lock said rod and said housing against extensible movement to lock said seat back member against movement toward its inclined position, said locking plates being effective to brake, but not lock, said rod against movement in a contracting direction whereby said seat back member may be moved toward its upright position, a cam member rotatably supported in said housing for selective direct engagement with said locking plates on the side of said rod opposite said fulcrum, and means for rotating said cam to move said lock plates against the force of said locking spring until said lock plates are substantially normal to said rod whereby said rod may be freely moved in either direction.

2. The combination according to claim 1, wherein said fulcrum comprises a pin carried by said housing and extending across said housing transversely of the axis of said rod.

3. The combination according to claim 1, wherein said housing comprises a pair of substantially identical flat members assembled in mirror image relationship.

4. The combination according to claim 1 together with a retainer fixed on said rod and wherein said operating spring is compressed between the end of said housing from which said rod extends and said retainer.

References Cited by the Examiner

UNITED STATES PATENTS

2,579,305	12/1951	Cushman	297—375	X
2,806,723	9/1957	Fairclough	248—355	X
3,136,528	6/1964	Eathough	240—355	X

FRANK B. SHERRY, *Primary Examiner*.

J. S. PETRIE, R. B. FARLEY, *Assistant Examiners*.