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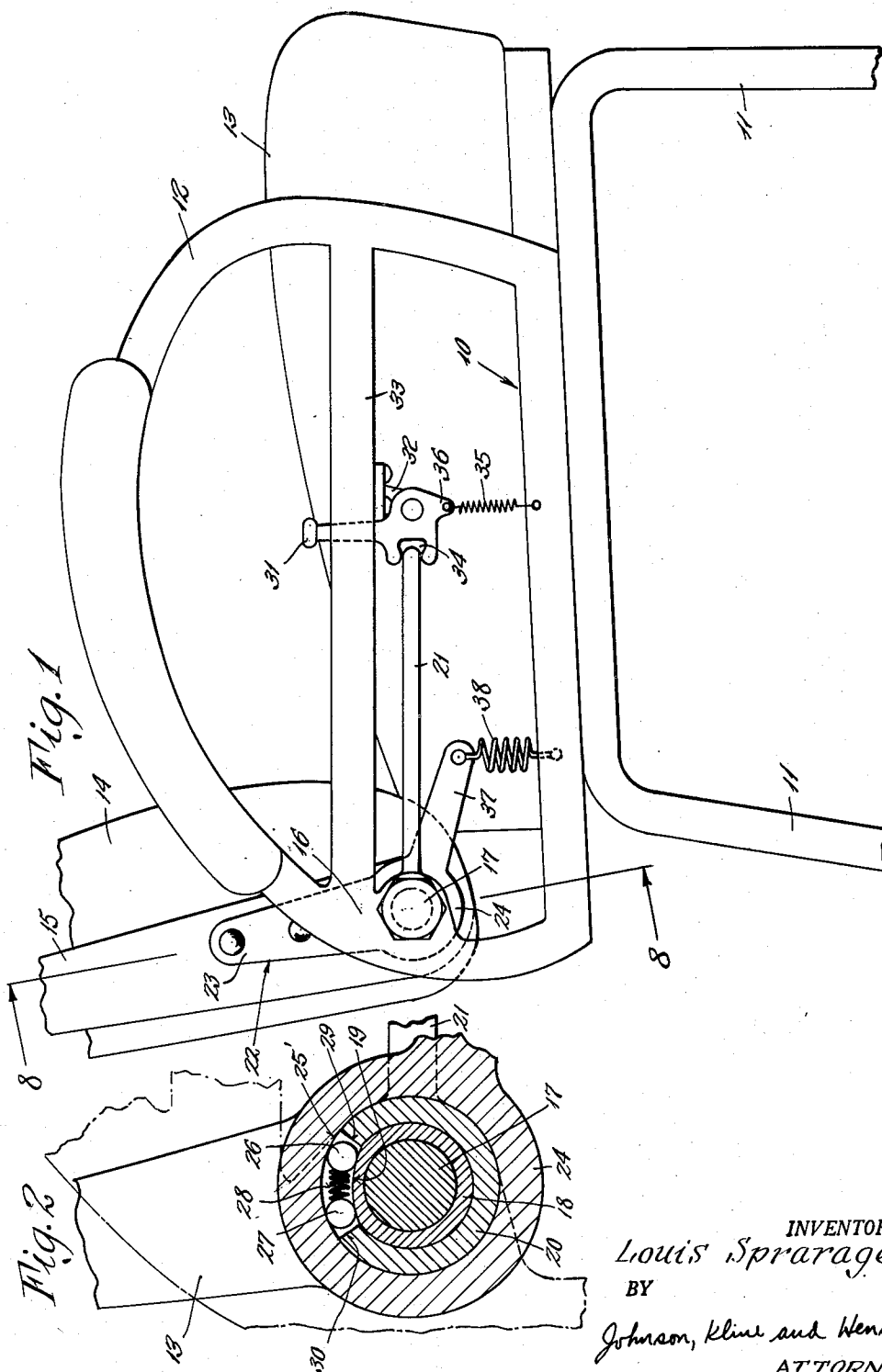
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CHAIR HAVING AN ANGULARLY ADJUSTABLE BACK REST

Filed June 14, 1946

3 Sheets-Sheet 1



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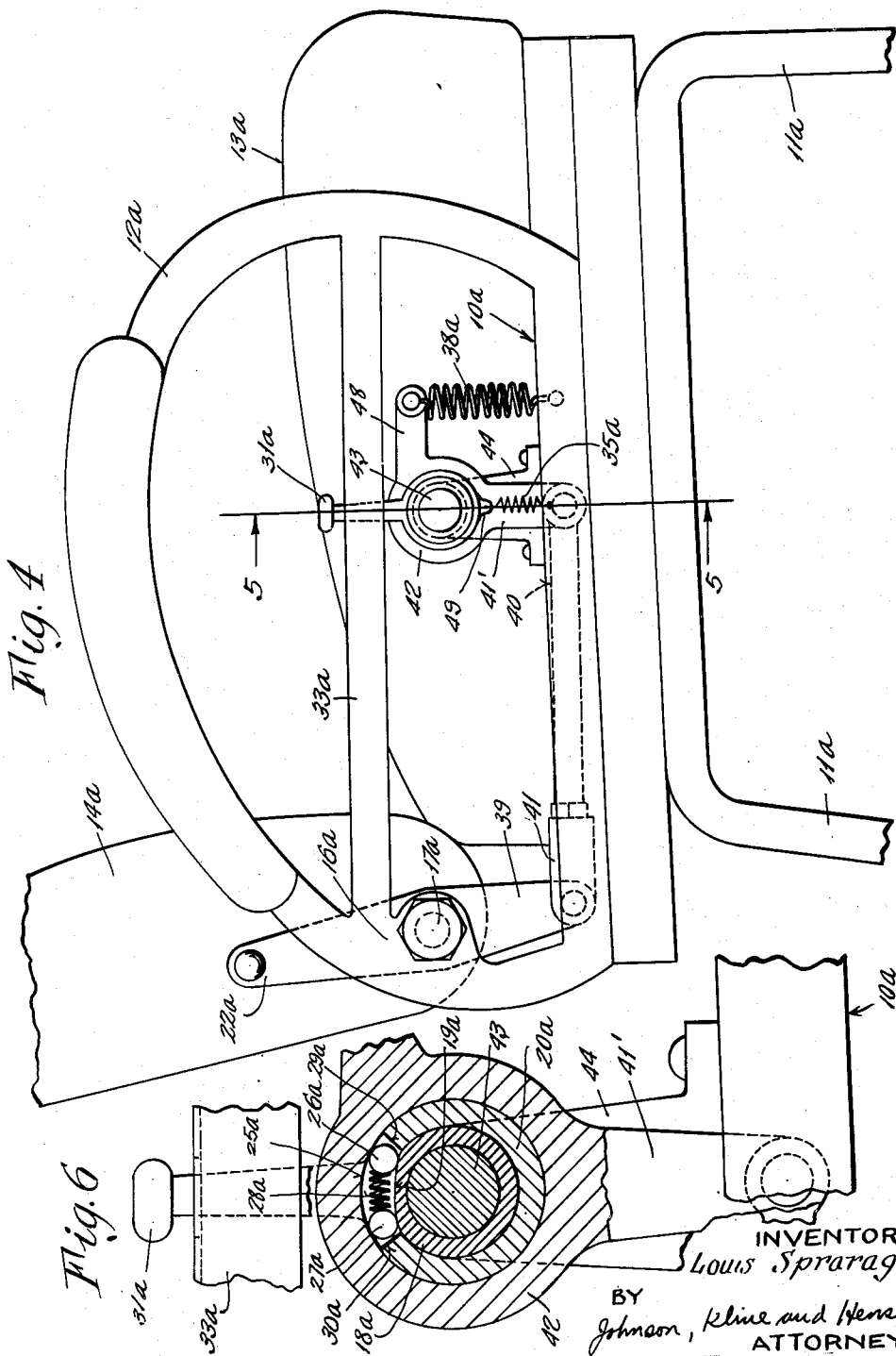
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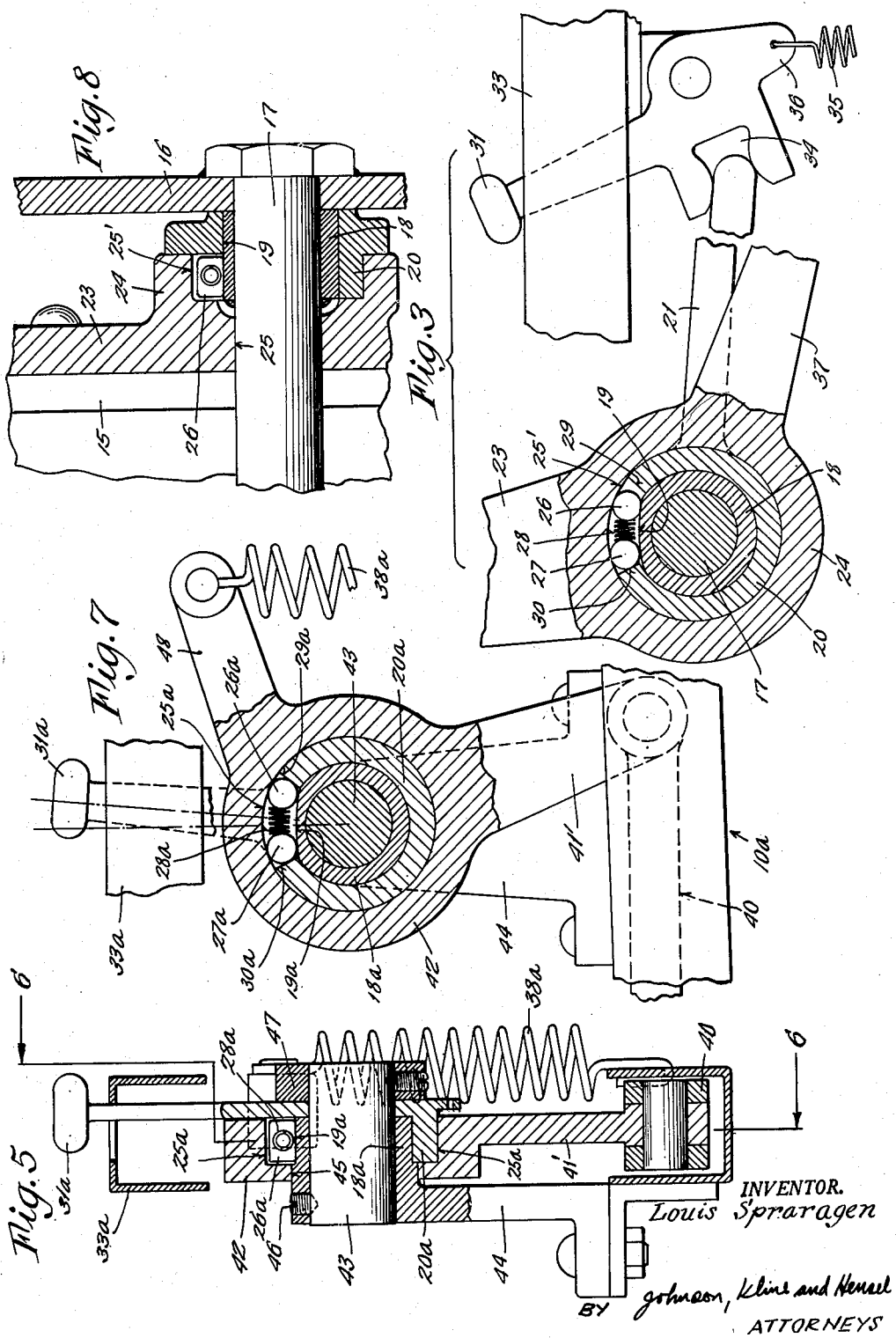
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UNITED STATES PATENT OFFICE

2,624,396

CHAIR HAVING AN ANGULARLY ADJUSTABLE BACK REST

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15 Claims. (Cl. 155—160)

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This invention relates to chairs or seats such as are used in coaches, busses, and the like, and more particularly to seats having parts which are adjustable as to adapt them for both sitting and reclining use.

An object of the invention is to provide an improved coach seat of this type wherein the parts may be quickly and conveniently adjusted by an occupant to any desired position between their limits, and there automatically locked, all with a minimum of time and effort being required.

This is accomplished by the provision of a novel locking and releasing means associated with the relatively movable parts of the seat having locking surfaces which are continuous, as opposed to steps, and having wedging members automatically movable into locking position, and easily movable for release by means of a lever or the like located conveniently to the occupant.

In the illustrated embodiments of the invention, the locking and releasing means are connected to the movable back of a chair, and the arrangement is such that when the occupant desires to adjust the back to a new position it is only necessary to grasp the release lever and move same to a releasing position, then move the back as desired, and let go the lever. As the lever is released, the wedging members of the lock are automatically moved to locking position again so that the back is held in its new adjusted position until next manually released, and the action is such that the more pressure the chair back is subjected to, the tighter the wedging and the more positive the locking.

A feature of the invention is that only comparatively light force is required on the releasing lever to effect release of the seat back, even when the latter is partly supporting an occupant's weight. Also, the provision of spring means, connected with the back for urging same forward, functions further to reduce the force required on the lever.

Another feature of the invention is the provision of a hand lever which may be located remote from the locking and releasing means for the seat back, and therefore may be mounted at the side of the sitting surface of the seat, where an occupant has convenient access to it, and the locking means may therefore be mounted at the pivot for the back, close to the sturdy supporting structures thereof so that the structures need not be extended.

Still another feature of the invention is the

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provision of a locking and releasing means as above outlined which is selective in its operation so that the seat back is released for either forward or rearward movement in response to either forward or rearward movement respectively of the releasing lever. This provides a better control of the seat back, especially if, as employed by the invention, there are means for continuously yieldably urging the back toward its upright forward position, since the locking means when released in response to movement of the lever functions as a ratchet due to its permitting movement of the seat back in one direction while preventing the same in the other direction.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

Figure 1 is a fragmentary side elevation of a chair embodying the invention.

Fig. 2 is a fragmentary sectional view through the pivot and the locking means for the chair of Fig. 1, with the parts in locked position.

Fig. 3 is a view similar to Fig. 2 but showing the parts released in response to operation of the hand lever.

Fig. 4 is a fragmentary side elevation of a chair showing a modified form of the invention.

Fig. 5 is a section taken on the line 5—5 of Fig. 4 with spring 35a omitted for clarity.

Fig. 6 is a fragmentary section taken on the line 6—6 of Fig. 5, showing the parts of the locking mechanism in locked position.

Fig. 7 is a view similar to Fig. 6, but with the parts unlocked.

Fig. 8 is a section taken on the line 8—8 of Fig. 1, on an enlarged scale.

As shown in Fig. 1, the invention is applied to a coach chair or seat having a frame 10, legs 11, arm rests 12, and a seating portion 13. A back 14 carried in a frame 15 is mounted adjacent its lower edge on the rear portions 16 of the arm rests 12 so that it can be swung forwardly and rearwardly for adjustment.

According to the present invention there is provided an improved locking and releasing means for the back 14 to enable an occupant to quickly and easily adjust the latter to any desired position between its limits for either sitting or reclining use. In carrying out this adjustment, the occupant first moves a conveniently located lever which releases the lock, then the back is adjusted, and when the lever is let go, the back is automatically locked in the new position, this all being accomplished with a minimum of effort.

Two embodiments of the invention are shown

herein as exemplary thereof. In the form illustrated in Figs. 1, 2, 3 and 8, the locking means is incorporated as part of one of the pivotal mountings of the back, further simplifying the structure of the device.

As shown in Figs. 1 and 8, the frame portion 16 of one of the arm rests 12 has a stud 17 fastened thereto extending inward and carrying a sleeve 18 having a cylindrical periphery relieved at its upper portion 19 to provide a pair of oppositely directed wedging surfaces. The other arm rest 12 has a pivot (not shown) aligned with the stud 17 and connected with the back 14 in any of various well known manners to support same for pivotal movement.

The sleeve 18 and stud 17 serve as an anchor member for the lock, and hence are rigidly fastened together, as by welding and also welded to the arm frame 16 to be immovable thereon.

Rotatably carried by the sleeve 18 is a bushing 20 having an operating arm 21 extending forward along the side of the seating surface 13, the bushing functioning as a release for the lock. For the purpose of pivotally connecting the back 14 to the frame 16 at the lock, a bracket 22 is mounted on the frame 15 of the back at the lower corner thereof (Figs. 1 and 8), said bracket having an arm 23 fastened to the frame with suitable bolts, and a hub 24 having an inner bearing surface 25 engaging the stud 17 so that the hub is rotatable thereon.

As thus supported, the back 14 is pivotally movable forward or rearward about its mounting, to adapt the chair for various reclining or sitting uses.

The locking of the back 14 in any of the various adjusted positions is accomplished by locking means associated with the bracket 22 and the anchor member comprising the stud 17 and sleeve 18, and one of the characteristics of said locking means is the provision of smooth, as opposed to stepped, locking surfaces making possible substantially an infinite number of adjusted locked positions.

For this purpose, as shown in Fig. 2, the bushing 20 has a segmental section thereof cut away sufficiently to clear the wedging surfaces 19 of the sleeve 18 so that a space exists between said surfaces and the outer bearing surface or race 25' of the hub, Fig. 2. The wedging surfaces 19 are arranged to approach the surface 25' as they merge with the cylindrical periphery of the sleeve 18. A pair of locking rollers 26 and 27, yieldably held apart by a coil spring 28, are located in the space provided by the cut-away portion of the bushing 20, the rollers being large enough to wedge between the surfaces 19 and surface 25' near their closest points, and prevent turning of the hub 24 in either direction. The roller 26 is wedged to prevent clockwise rotation of the hub, and the roller 27 to prevent counterclockwise rotation, and the bushing 20 is cut away sufficiently so that the edge 29 thereof clears the roller 26 when the latter is wedged in place, and the edge 30 similarly clears the roller 27.

In order to unlock the hub 24 and therefore unlock the back 14 for adjustment either forward or rearward, it is only necessary to turn the bushing 20 in either a clockwise or a counterclockwise direction from the position of Fig. 2, by means of the arm 21. When the bushing is turned in a clockwise direction the edge 30 thereof will move the roller 27 out of its wedging position, and release the hub 24 for counterclockwise turning only. During this turning the roller 26 re-

mains substantially in wedging position due to the pressure of the spring 28, and functions as a clutch which permits counterclockwise turning of the hub, but prevents clockwise turning. When the bushing 20 is returned to the position of Fig. 2, the roller 27 will again wedge and lock the hub, and the latter, due to the absence of steps in the bearing surface or race 25', may be locked to hold the back 14 in any of an infinite number of positions. If the bushing is turned counterclockwise, the edge 29 moves the roller 26 out of wedging position and releases the hub 24 and back 14 for clockwise or forward adjustment, and the roller 27 then functions as the ratchet, under the pressure of the spring 28. Whenever the bushing 20 is in the locking position of Fig. 2, the spring 28 will hold both rollers 26 and 27 in wedging and locking position.

This invention further provides means enabling an occupant of the seat to conveniently and easily operate the arm 21 for turning the bushing 20 to release the back 14 for adjustment.

Referring to Fig. 1, the arm 21 extends forward along the side of the seating surface 13 and terminates at a point approximately midway thereof, where it is operatively connected with a hand-operable lever 31 pivotally carried by a bracket 32 mounted on a cross-bar 33 of the arm rest 12, the lever extending through a slot in the cross-bar, and the connection to the lever being such that forward movement thereof will result in release of back 14 for forward adjustment, and vice versa. As shown, the connection between the arm 21 and the lever 31 comprises a transverse slot 34 in the lever having convex side walls engaging the end of the arm, which is rounded for this purpose. When it is desired to adjust the back 14 forward, the lever 31 is pushed forward. This raises the arm 21, and turns the bushing 20 counterclockwise which unlocks the back for forward adjustment. To release the back for rearward movement, the lever 31 is moved rearward as seen in Fig. 3, which lowers the arm 21 and turns the bushing in a clockwise direction.

For the purpose of returning the hand lever 31 and therefore the arm 21, to intermediate locked position as shown in Fig. 1 and for yieldably holding said lever and arm in this position, there is provided a helical tension spring 35 connected at one end to the frame 10 and at the other end to a depending extension 36 on the hub of the lever, said extension being apertured as shown for receiving the spring end. Thus, after the seat back has been adjusted and the occupant lets go of the lever 31 it will be returned by the spring 35 to the intermediate position, and the spring 28 acting on the rollers 26 and 27 will automatically cause these to wedge and lock the back in the new position. The springs 28 and 35 aid each other in this respect, both acting to return the lever to intermediate position.

I have found it to be advantageous also to yieldably urge the seat back 14 toward its foremost limit, and accordingly the bracket 22 supporting said back is provided with a forward extending arm 37 connected at its free end to the frame 10 by a helical tension spring 38. This facilitates the adjustment of the back, since when the lever 31 is moved rearward, the roller 26 which is still in wedging position, continues to oppose the spring 38 but now may function as a ratchet. As a result, an occupant of the seat, after moving the lever rearward, may adjust the back 14 rearward by merely pressing against same to move it to the desired position, and should this pres-

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sure be removed before the lever is let go of, the back will not shift but will stay in the position it was placed. Also, when the back 14 is being adjusted forward after the lever 31 has been moved forward, the spring 38 will operate so that an occupant need only remove his pressure from the back, and the latter will automatically follow to any new forward position desired. The spring 38 also serves to counteract the effect of a person's weight on the back 14.

The rollers 26 and 27, which are preferably of hard steel or alloy, provide a positive lock for the back 14 of the seat, and the more pressure the back is subjected to, the tighter the wedging of the roller opposing said pressure, and therefore the stronger the locking action. However, when it is desired to move one of the rollers to releasing position this can be done with comparatively light pressure, regardless of whether or not that particular roller is opposing a substantial pressure at the time.

It will be noted that the construction shown in Fig. 1 provides for all of the comparatively heavy supporting members and the locking members being located at or near the pivotal mounting for the back 14 where they are of compact construction. This results in a saving of weight and materials. Also, the releasing means for the lock is such that the hand operable lever 31 for same may be remote, as shown in the figure, from the locking and mounting members, and located to be especially convenient to the seat occupant, and this lever and the connecting arm 21 need not be of particularly heavy construction.

A modified form of the invention is shown in Figs. 4 through 7. A seat comprising a frame 10a, legs 11a, arm rests 12a and seating portion 13a has a back 14a carried by a pair of supporting members 22a fastened thereto by suitable bolts and pivotally mounted by means of studs 17a on rear portions 16a of the arm rests. As thus mounted, the back 14a may be moved forward or rearward for adjustment about the pivots 17a.

For the purpose of controlling the positioning of the back 14a, one of the supporting members 22a is provided with a depending arm 39 apertured at its extremity and pin-connected to one end of a link 40 by means of a bifurcated connector 41 threaded on the link and locked by a nut as shown. The other end of the link 40 is pin-connected to a depending arm 41' of a bell crank 42 which is mounted for turning about a stud 43 carried by a bracket 44 fastened with bolts to the frame 10a. As provided by these connections, movement of the back 14a will cause turning of the bell crank 42, and if the latter is locked to the frame 10a so that it cannot turn, the back 14a will be locked against movement.

Accordingly, as shown in Figs. 5 and 6, the bracket 44 is provided with a sleeve encircling the stud 43 and having an outer cylindrical bearing surface 45 on which the bell crank 42 is pivotally carried, said sleeve having a portion 18a with an outer cylindrical surface of reduced diameter and which is relieved at its top to provide oppositely directed wedging surfaces 19a. The sleeve portion 18a thus serves as an anchor member for the locking means for the bell crank 42, and to this end the latter has an enlarged bore or race 25a spaced from said sleeve portion, there being provided locking or wedging rollers 26a and 27a located between the surfaces 19a and the race 25a, and a helical compression spring 28a yieldingly holding the rollers in wedging position.

To provide manually engageable means for

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moving the rollers 26a and 27a selectively out of their wedging positions, a lever 31a is pivotally mounted on the stud 43 to extend through a slot in the arm rest brace 33a, the lever having an annular flange 20a extending into the space between the sleeve 18a and the race 25a. The flange 20a has a segmental portion cut away to provide edges 29a and 30a for respectively engaging the rollers 26a and 27a selectively to move one or the other out of wedging position according to whether the lever 31a is moved forward or backward.

For the purpose of preventing the bell crank 42 and lever 31a from sliding off the sleeve of the bracket 44, the stud 43 is anchored to the bracket by a set screw 46, and a collar 47 is provided at the other end of the stud, fastened by a similar set screw and engaging the side of the lever.

A helical coil spring 38a is anchored at one end to the frame 10a and connected at its other end to an arm 48 of the bell crank 42, the spring being under continual tension and serving to move and yieldably hold the back 14a in a foremost upright position when the latter is not under the restraint of the locking means.

For the purpose of moving the lever 31a to its intermediate locking position when it is let go after adjustment of the back 14a, and to yieldably hold the lever in said position, a coil spring 35a (Fig. 4) is provided, having one end connected to the frame 10a and the other end connected to a depending apertured lug 49 extending from the hub of the lever. Both the spring 35a and the roller spring 28a function to return the lever 31a to its intermediate position.

The functioning of the lock and release in the modified form of the invention shown in Figs. 4 through 7 is substantially similar to that of Figs. 1, 2 and 3, except that the hand operable lever 31a of the modified form is moved in a direction opposite to that in which the seat back 14a is to be adjusted.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. An adjustable chair having a frame; a rest pivotally mounted thereon and movable relatively thereto; wedging means located at the pivot for the rest for automatically locking the rest on the frame against movement in any and all adjusted positions of the rest; and a pivoted member movable through an arc in opposite directions independently of the rest for releasing the wedging means and freeing the rest for independent movement in either direction.

2. The invention as defined in claim 1 in which the releasing means includes a projecting hand operable member movable in reverse directions from a projecting neutral position, said releasing means being operative to release the rest for adjustment in one direction or the other depending on whether said member is positioned at one or the other side of said neutral position.

3. The invention as defined in claim 1, in which the rest is movable forwardly and rearwardly relatively to the frame, and in which the releasing means includes a projecting hand operable member movable forwardly and rearwardly from a neutral position, said releasing means operating to release the rest for adjustment either forwardly or rearwardly in response to movement of the operable member forwardly or rearwardly respectively from said neutral position.

4. The invention as defined in claim 1 in which

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the releasing means includes a projecting hand operable member movable in reverse directions by an operator from a neutral position and yieldably held in said neutral position; and yieldable means for holding said member in said neutral position, said releasing means being operative to release and free the rest for adjustment in one direction or the other selectively in response to movement of the operable member from said neutral position, said yieldable means returning said member to said neutral position when disengaged by the operator.

5. A chair having a frame; a rest pivotally mounted on the frame to be angularly adjustable; wedging means for automatically locking the rest against movement in any and all adjusted positions on the frame, said means being interposed between the frame and rest at the pivot point of the latter; and manually engageable means remote from the said pivot point for releasing said wedging means to permit selected adjustment of the rest to desired position.

6. An adjustable chair having a frame; a rest thereon movable relatively thereto; a pair of relatively movable members operatively connected one to the frame, and the other to the rest to move therewith, one of said members having a race and the other having a surface facing and spaced from the race but extending in a direction approaching same, the members being so shaped and mounted that relative movement between the rest and the frame maintains said spaced relationship between the members substantially constant in all positions thereof; a locking member disposed between said race and surface to engage the race and the surface of the movable members to wedge between and lock same against movement whereby the rest and frame are locked together; and means for selectively moving the locking member out of its wedging position to release the rest for adjustment in either direction.

7. An adjustable chair having a frame; a rest thereon movably mounted thereon; a cylindrical stud rigidly mounted on the frame, having a portion of its periphery relieved; a rotatable member carried on the stud, having an internal annular race facing and spaced from the periphery of the stud, said member being connected to turn in response to movement of the rest; a locking member adapted to engage the race and the relieved periphery of the stud to wedge between same and lock the rotatable member to the stud whereby the rest is locked to the frame; and means for selectively moving the locking member out of its wedged position to release the rotatable member so that the rest may be adjusted in either direction.

8. The invention as defined in claim 6 in which the member having the surface facing and approaching the race has a second surface similar to the first but removed therefrom and approaching the race in an opposite relative direction, in which there is a second locking member adapted to engage the race and the second surface whereby each locking member prevents movement of the rest in a direction opposite to the other, and in which there are means for moving the second locking member out of wedging position so that the rest may be adjustably moved in either direction.

9. The invention as defined in claim 6 in which the member having the surface facing and approaching the race has a second surface similar to the first but removed therefrom and approach-

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ing the race in an opposite relative direction, in which there is a second locking member adapted to engage the race and the second surface whereby each locking member prevents movement of the rest in a direction opposite to the other, and in which the means for moving the locking member out of wedging position includes a hand operable member movable in one direction to release said locking movement, movable in a reverse direction and having means operable in response to said reverse movement for releasing the second locking member whereby the rest may be adjustably moved in either direction selectively according to the direction of releasing movement of the operable member.

10. A chair having a frame; a back pivotally mounted at its bottom edge on the frame to be angularly adjustable; a control member pivotally mounted on the frame and connected with the back to control movement thereof, said member having an internal annular race concentrically located with respect to said pivot; an anchor member fastened to the frame to extend inside the race, having a surface facing and spaced from the race but extending in a direction approaching same, the members being so shaped and mounted that relative movement between the back and frame maintains said spaced relationship substantially constant in all positions thereof; a locking member disposed between said race and anchor member to engage the surface of the anchor member and the race of the control member to wedge against and lock the latter to the frame whereby the back is held in an adjusted position; means for yieldably holding the locking member in its wedged position; and a hand operable releasing lever pivotally mounted on the anchor member, having a lug extending between the latter and the race adapted to engage the locking member and move same out of wedged position to release the back for adjustment.

11. An adjustable chair having a frame having a seat; a back pivotally mounted at its bottom on the rear of the frame to be angularly adjustable; means connected with the pivotal mounting of the back for automatically locking same to the frame in an adjusted position; means for releasing the locking means, including an elongate lever extending from the said pivotal mounting forwardly alongside the seat to terminate at a point remote from the back and at the side of a sitter; and a bell crank pivotally mounted on the frame at the side of the seat, pivotally and slidably connected with the lever to operate the release lever, said crank having an arm with a handle within easy reach of the sitter.

12. The invention as defined in claim 6 in which the member having the surface facing and approaching the race has a second surface similar to the first but removed therefrom and approaching the race in an opposite relative direction, in which there is a second locking member adapted to engage the race and the second surface whereby each locking member prevents movement of the rest in a direction opposite to the other, and in which the means for moving the locking member out of wedging position includes a hand operable member yieldably held in a non-releasing position and movable in one direction and having means responsive to said movement to release said locking member, movable in a reverse direction and having means operable in response to said reverse movement for releasing the second locking member whereby the rest may be ad-

justably moved in either direction selectively according to the direction of releasing movement of the operable member.

13. An adjustable chair having a frame; a rest thereon movable relatively thereto; a control member pivotally mounted on the frame and connected with the rest to control movement thereof, said member having an internal annular race concentrically located with respect to said pivot; an anchor member fastened to the frame to extend inside the race having a pair of surfaces facing and spaced from the race but extending to approach same in opposite directions, the members being so shaped and mounted that relative movement between the rest and the frame maintains said spaced relationship between the members substantially constant in all positions thereof; rollers, each engaging one surface of the anchor member and the race of the control member to wedge against and lock the latter to the frame to prevent bi-directional turning thereof whereby the rest is held in an adjusted position; a spring engaging the rollers to yieldably hold same in wedged position; and a hand operable releasing lever pivotally mounted on the anchor member, having means extending between the latter and the race, for selectively engaging and moving one or the other of the rollers out of wedged position according to movement of the lever in one direction or the other, so that the rest is released for adjustment selectively in one direction or the other.

14. An adjustable chair having a frame having a seat; a back pivotally mounted at its bottom on the rear of the frame, to be angularly movable; a control member pivotally mounted on the frame at one side of the seat so as to be located alongside a sitter, said member being connected by a link with the chair back to control the movement thereof; means for automatically locking the control member to the frame against movement in either direction to maintain the back in

adjusted position; and a hand operable lever mounted on the frame and connected to the control member and having means for selectively releasing the locking means to free the back for movement in a predetermined direction whereby movement of the lever to a releasing position in one direction will allow the chair back to be moved to a new position in a corresponding direction.

15. The invention as defined in claim 7 in which the chair has a seat, in which the rest comprises the back of the chair mounted to pivot at its bottom, and in which the means for moving the locking member out of its wedged position includes a pivotally mounted lever having a common axis with the chair back, and extending forwardly at the side of the seat to terminate alongside a sitter for convenient operation by the latter.

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