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3,036,863

CHAIR ASSEMBLIES WITH ROCKABLE BACKS

Filed Feb. 1, 1960

4 Sheets-Sheet 1

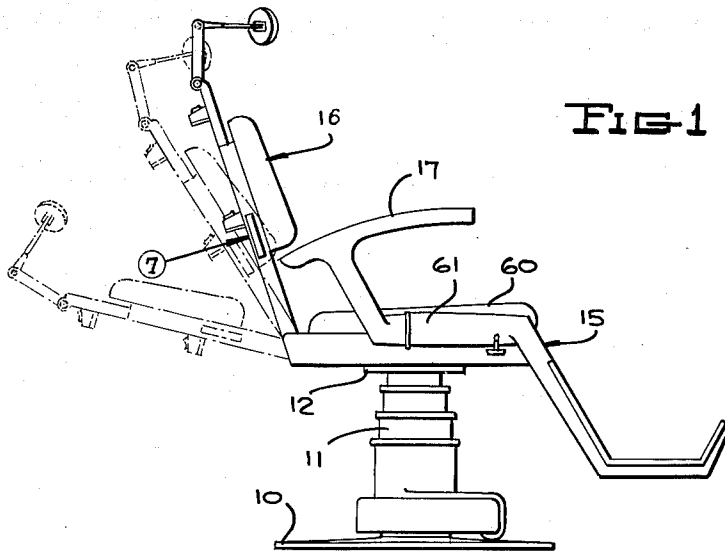


FIG. 1

FIG. 2

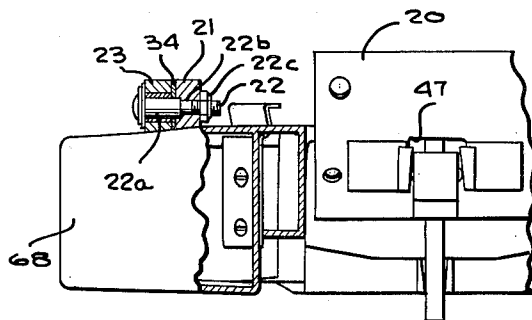
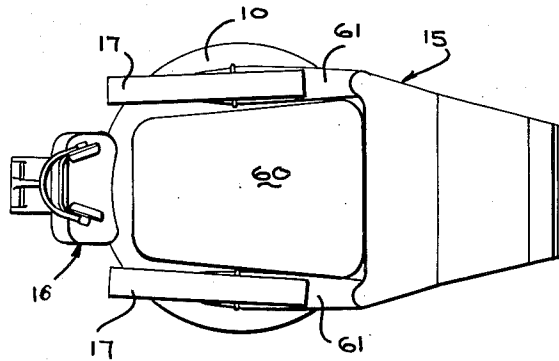


FIG. 4

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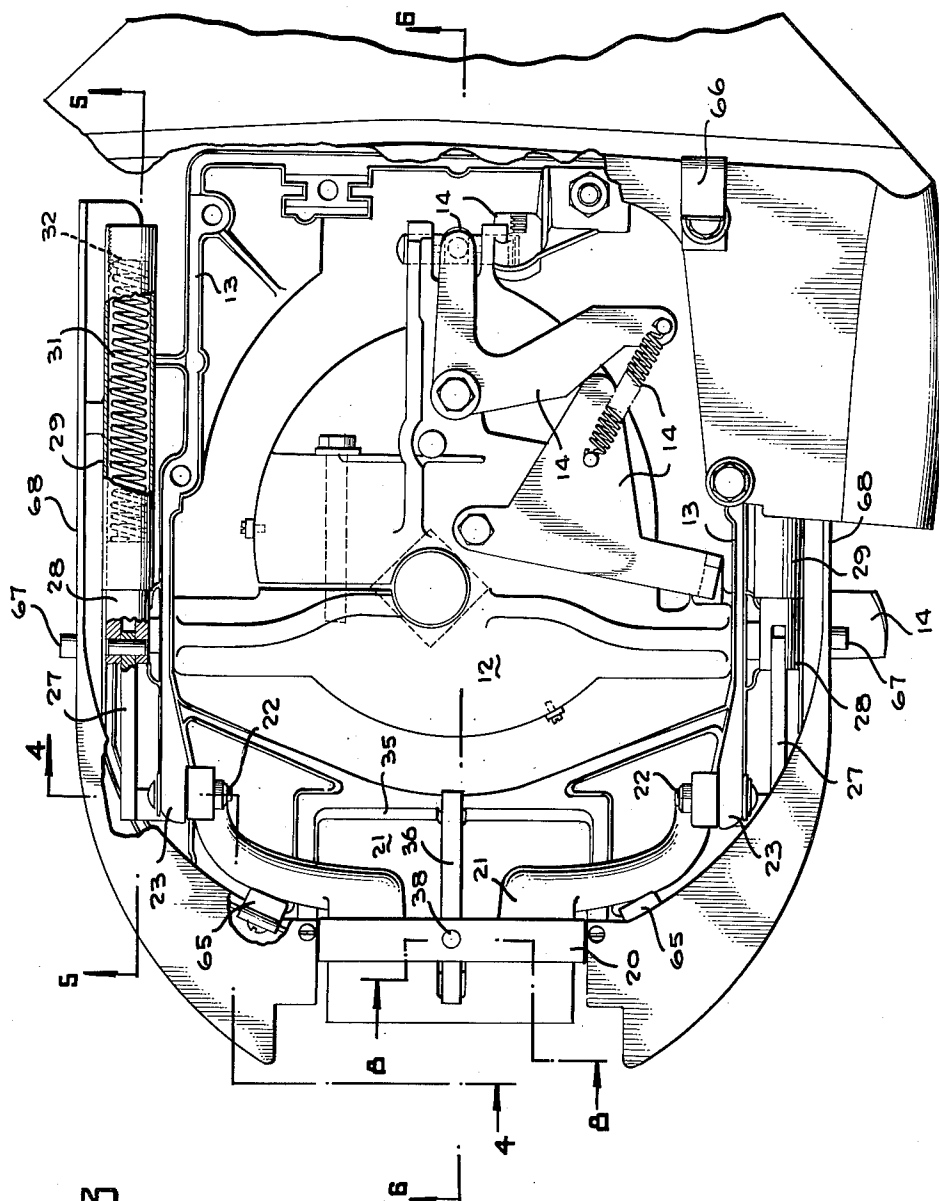


FIG. 3

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FIG. 5

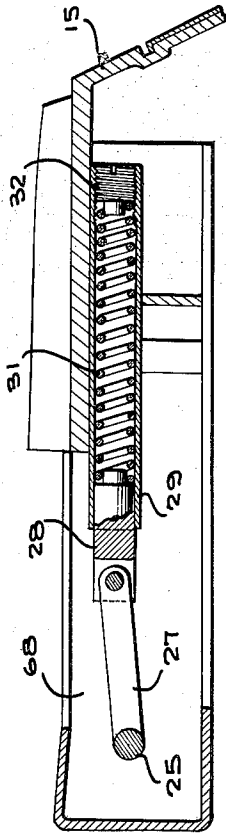
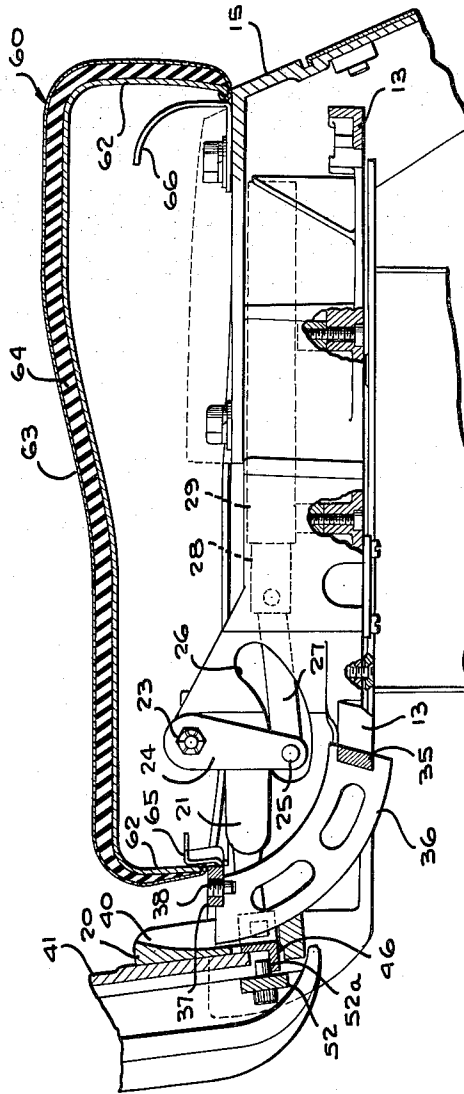


FIG. 6



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FIG. 8

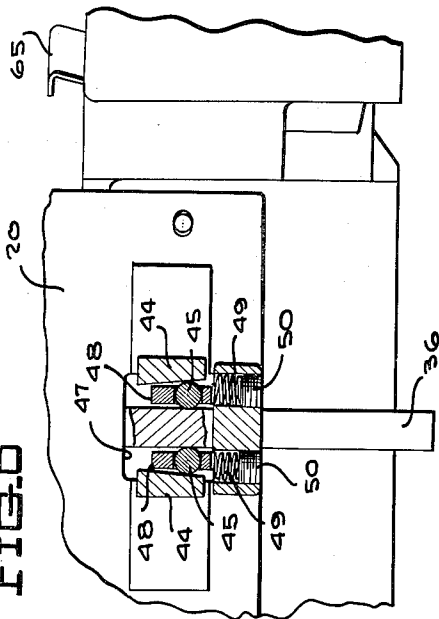


FIG. 9

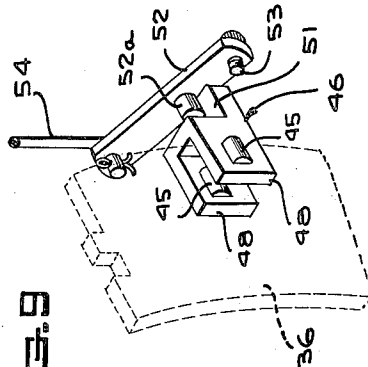
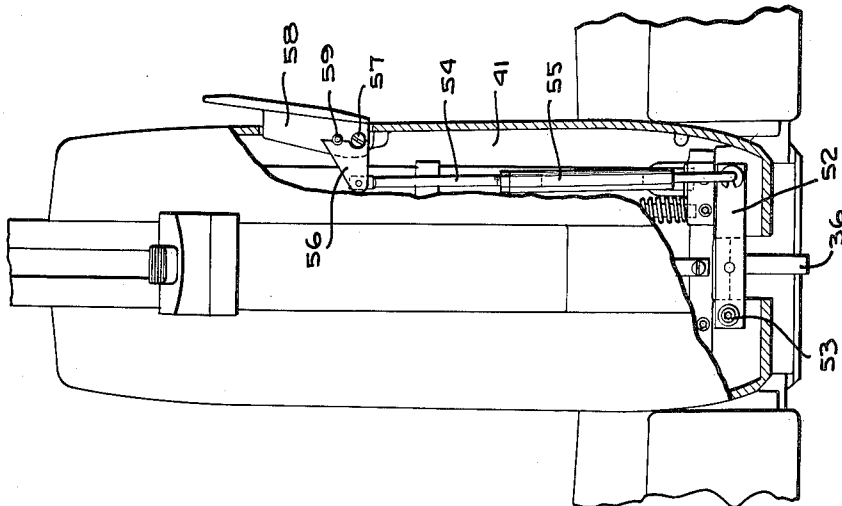


FIG. 7



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CHAIR ASSEMBLIES WITH ROCKABLE BACKS
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Pa., a corporation of Pennsylvania
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11 Claims. (Cl. 297-374)

This invention relates to chair assemblies having seats and backs which can be rocked relative to the seat; and is particularly of value for service chairs such as those used by dentists.

Such general arrangements are known and in use. It is desirable that the service attendant, e.g., the dentist, be able to adjust the back while the chair is occupied; and that the back be rigidly fixed, relative to the seat, in the selected position.

An object of the invention is the provision of a chair assembly in which the pivotal parts are covered by the seat, both for concealment and for preventing injury to the occupant or attendant.

Another object is the provision of a chair assembly in which trunnion pivots are employed between the seat and back, with friction means to prevent sudden and uncontrolled relative movements when the locking device is released, and with counterbalancing means associated with pivotal members to reduce the effort involved in adjusting the back position.

Another object is the provision of a chair assembly in which the position fixing or locking device for a movable back includes a self-adjusting member whereby wear is automatically compensated.

Another object is the provision of a chair assembly in which a position fixing or locking device is provided for the seat and back, with oppositely acting locking parts operative upon a self-adjusting member between them whereby equal locking efforts are exerted by the parts.

With these and other objects in view, as will appear in the course of the following description and claims, an illustrative embodiment is shown on the accompanying drawings, in which:

FIGURE 1 is a side elevation of a chair assembly, with one position of the back shown in full lines, and another position shown in dotted lines;

FIGURE 2 is a top view of the chair of FIGURE 1;

FIGURE 3 is a top view, on a larger scale than in FIGURE 2, with the seat portion removed;

FIGURE 4 is a section on line 4-4 of FIGURE 3, showing the trunnion system;

FIGURE 5 is a section on line 5-5 of FIGURE 3, showing a counterbalance arrangement;

FIGURE 6 is an upright section on line 6-6 of FIGURE 3, showing a locking member;

FIGURE 7 is a rear view substantially in the direction of the arrow 7 in FIGURE 1, of the back portion, with parts broken away to show parts of the locking arrangement and its actuator;

FIGURE 8 is a sectional view on line 8-8 of FIGURE 3;

FIGURE 9 is a perspective view of locking parts, with a locking sector in dotted lines.

The illustrated chair is for dentists' use; and has a base 10 for mounting on a floor, with a telescoping column 11 rising therefrom and having at the top a support member 12 on which is mounted by a transverse pivot a seat frame 13 which can be tilted, and fixed in position, illustratively by the parts 14. A foot rest and arm rest assembly 15 is fixed to the frame 13 to move therewith. A tilting back 16 is pivoted relative to the frame 13 so that it can occupy various positions such as those shown by the full and dash lines in FIGURE 1. Arms

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17 are pivoted to the assembly 15 for controlled rocking movement.

According to this invention, a locking back support member 20 is connected fixedly to the back, and, FIGURES 3 and 6, has laterally extending arms 21 which have pivot shaft 22 fixed thereon and rotatable in the side wings 23 illustratively formed integral with the frame 13 and providing trunnions between the seat and back structures. Downward extensions 24 of the arms 21 carry pivots 25 at their lower ends, which project laterally outward through arcuate slots 26, FIGURE 6. Links 27 are connected at pivots 25 and extend relatively forward, and are pivotally connected to blocks 28 which can slide in the tubes 29 fixed on the frame 13 inside the laterally and forwardly extending side plates 30 fixed to the frame 13. As shown in FIGURE 3 for one of the tubes 29, compression springs 31 are within the tubes 29 and effective for urging the blocks 28 toward the rear, i.e., toward the left in FIGURES 1, 3 and 6, and reacting against threaded plugs 32 in the front ends of the tubes: by adjustment of the plugs 32, the effort of the springs can be regulated to determine the return of the back 16 from the dotted line toward the full line position of FIGURE 1, thereby providing a counterbalance for the weight of the back.

It is preferred to provide a dampener for the otherwise free pivotal tilting movement of the back. This is illustratively attained at the pivot shafts 22, FIGURE 4, by forming these shafts with stems 22a which closely fit the wings 23 and with threaded portions 22b extending beyond the inner faces of the arms 21, for receiving the nuts 22c. A friction washer 34 is interposed between the respective wings 23 and associated arms 21. The nut 22c is drawn tight, until the frictional effect requires a force of, say, 4 to 7 pounds to be exerted at the head rest pivot, with the head rest at its highest and most extended position and with the tilting back at about 60 degrees to the horizontal.

The lower rear cross-member 35 of the frame 13, FIGURE 6, provides a rail along which the locking sector plate 36 for the tilting back may move from side to side. This sector 36 is bifurcated at its lower end to engage the member 35, and is thereby prevented from moving upward, downward or forward. The sector 36 extends arcuately about the trunnion axis at shafts 22, and at its upper and rear end is guided by the lower surface of the rear upper cross-member 37 of the frame 13 and is hereby detained against upward movement. A transverse notch in the upper end of the sector 36 receives a guide pin 38 mounted on the cross-member 37, FIGURE 6, and is thereby detained against forward or backward movement. The sector 36 can move transversely along the cross-members 35 and 37.

The back support 20, FIGURE 6, is rigidly connected to the lower end of the back frame 41 by screws. The sector 36 fits loosely in an upright groove in the front part of the support 20, for permissive transverse movement relative thereto, with the root of the groove having parts loosely conformed to the outer or rear edge of the sector.

The back support 20 has opposed projections 44 at the two faces of the sector 36 and spaced therefrom. The inner surfaces of the projections 44, FIGURE 8, converge upwardly. Locking rollers 45 are located between the projections and the respective adjacent surfaces of the sector 36. A stop block 46 extends through an aperture 47 of the support 20, being guided at its sides for relative upward and downward movements, and is bifurcated at its front end to provide fingers 48 which extend between the projections and the respective sector surfaces, and have holes for receiving the rollers 45. Springs 49 urge the fingers 48 upward, for engaging the

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balls in wedging position between the surfaces and thereby preventing rearward rocking of the back relative to the seat. The lower ends of the springs 49 are guided in pockets in the support 20, and react against plugs 50 threaded into these pockets.

The stop block 46 has a rearward projection 51 located beneath a pin 52a on a lever 52 pivoted at 53 on the back frame at one of the lever ends, and connected to a link 54 at the other lever end. The link 54 extends upward in the back structure, and includes a turnbuckle 55 by which its length may be adjusted. The upper end of the link 54 is connected to a crank lever at a horizontally extending leg 56 thereof. The crank lever has a pivot mounting 57 on the back frame, and its other leg 58 extends outward through the back frame structure and upward for ready access by the dentist. A weak spring 59 urges the leg 58 to move so that the lever 52 holds its actuator pin 52a in contact with the projection 51 on the block 46.

As shown in FIGURES 1, 2 and 6, a seat 60 covers the seat frame 13 between the lateral projections 61 which carry the chair arms, and extends from the back structure to a point above the drop portion leading to the foot rest. This seat is illustrated, FIGURE 6, as formed of sheet metal with a skirt portion 62; and covered with fabric 63 over a rubber cushion pad 64. At the rear, an intumed lower edge of the skirt 62 engages hooks 65 on the seat frame: at the front, the upstanding spring clips 66 yield when the seat is forced over them, and thereafter hold it removably in place. At the sides, the lower edge of the skirt 62 can rest on rubber bumper blocks 67 extending (FIGURE 3) from the sheet metal side trim pieces 68, so that the seat 60 overlaps the outer parts of the trim pieces. In FIGURES 2, 4 and 6, it will be noted that the working parts of the seat and back pivots are all beneath the seat, being concealed thereby so that the seat prevents accidental contact by the occupant with such parts by his body or hands, and therewith providing a generally smooth external appearance without the encumbrance of any projecting parts except the arms and back structure. The manual control lever part 58 is behind the back cushion, and is not accessible to an occupant who is in normal position in the chair; and also is not in position for accidental contact by the dentist.

In operation, the back is normally urged toward the full line position, FIGURE 1, relative to the seat by the action of the counterbalancing springs 31, under control by the friction effect at the washers 34. The locking rollers 45 are in raised position and wedged between the projections 44 on the back and the sector 36 held by the seat frame, so that backward pressure on the back structure does not cause a rearward and downward tilting thereof. If such tilting is desired, so that the back will be at a more horizontal position relative to the seat, the dentist presses the accessible manual control leg 58 inward toward the axis of the back assembly. Therewith, the link 54 is forced downward, and rocks the lever 52 downward, so that the block 46 is moved downward and its fingers 48 press the rollers 45 downward from their locking position, thereby releasing the support 20 so that the back assembly may be pushed backward about its trunnions, wherewith the extensions 44 fixed to the support 20 and wings 21 act to move the links 27 and blocks 28 forwardly, compressing the counterbalance springs 31. Upon releasing the manually operable leg 58, it is moved outward by spring action, and the rollers 45 are lifted by the springs 49 by means of the fingers 48 and again lock the support 20 to sector 36, against further rearward tilting. When in a rearward tilted position, the back structure can be shifted toward a more upright position, by pressing the upper end of the back structure forward, with the weight of the patient against it, noting that part of the returning effort is being exerted by the compensating springs 31. Therewith, the projections 44 of the support 20 are being lifted relative to the rollers 45 so that the latter do not prevent the movement: if the back is

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lifted only part way toward the full line position, FIGURE 1, the rollers 45 immediately engage again and preserve this position.

The permissive lateral or transverse movement of one of the locking members, illustratively the sector 36, relative to its support, effects an automatic adjustment of the relative efforts of the rollers 45. For example, if the left hand roller in FIGURE 8 for any reason exerts a greater pressure against the sector 36 than the right hand roller, the sector yields transversely until the efforts are balanced. This avoids the need of any careful balancing adjustment for such forces, and provides automatic compensation in the event of greater wear at one side than at the other, at the surfaces of the sector 36 or the projections 44.

The invention is not limited to the illustrative embodiment; and can be employed in many ways within the scope of the appended claims.

What is claimed is:

1. A chair assembly with a rockable back, comprising a seat portion and a back portion, a pivot member connected to the back portion and cooperative pivot parts connected to the seat portion, said pivot member having a radially projecting arm, a sleeve fixedly connected to the seat portion against movement relative thereto upon rocking of the back, a compression spring within the sleeve, and a connection from said arm for compressing said spring when the back portion is rocked backward relative to the seat portion.
2. A chair assembly as in claim 1, in which a threaded member is received within the tube for receiving the reaction of the compression spring, and is adjustable along the tube for regulating the forwardly reaching effort exerted by the spring.
3. A chair assembly with a rockable back, comprising a seat portion and a pivotally mounted back portion; an upright plate held by the seat portion with permissive transverse movement, said seat portion having parts for preventing rocking of the plate relative to the seat portion about the pivotal axis for the back portion, a stop block carried by the back portion for upward and downward movement relative thereto, said block having fingers extending at opposite faces of the plate, and locking devices carried by the fingers for engaging the opposite faces of the plate; parts connected with the back portion and effective to engage said locking devices with the plate for preventing rocking of the back portion in one direction, means for urging the block into locking position, and means for moving the block from locking position.
4. A chair assembly as in claim 3, in which the said urging means comprise springs seated on the back portion.
5. A chair assembly as in claim 3, in which the said moving means includes a projection on the block, and means carried on the back portion for moving said block against the action of said urging means.
6. A chair assembly as in claim 5, in which the said means carried by the back portion includes a lever having a part movable therewith to press against said block projection, a link connected to the lever and extending upward, and a second lever pivoted on the back portion for moving said link.
7. A chair assembly with a rockable back, comprising a frame, a seat portion having a top and sides held against movement relative to the frame, a back portion, a pivot member connected to the back portion and extending beneath the top of the seat portion, cooperative pivot parts on the frame and located beneath the top and between the sides of the seat portion, a crank arm connected to said pivot member, spring means connected between the frame and said crank arm for causing upward swinging of the back portion, friction brake means associated with said pivot member and parts for restricting rocking movement of the back portion relative

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to the seat portion, and means on the frame and pivot member for holding the back portion in adjusted position independently of the action of said friction brake means.

8. A chair assembly with a rockable back, comprising a frame, a seat portion on the frame, a back portion including a pivot member fixed thereto and extending beneath the seat portion, pivot parts located on the frame beneath the seat portion and cooperative with said pivot member, a plate mounted on the frame for permissive lateral movement and extending radially relative to the axis of said pivot parts, parts on the frame for preventing rocking movement of the plate relative to the seat portion, opposed friction devices on the back portion for engaging said plate at opposed surfaces thereof, and manually operable means for controlling the engagement of said friction devices with the plate.

9. A chair assembly, comprising a frame, a seat portion mounted on the frame, a rockable back portion and a pivotal connection therefor mounted below the top of the seat portion, a plate secured against rocking relative to the frame about the pivot axis, a member carried by the back portion in its rocking movement and having projections located at opposite sides of the plate, spaced plate-engaging means located between said projections and movable upward and downward on the back portion, first means for moving the said plate-engaging means upwardly relative to the back portion, said projections having parts cooperative with the plate-engaging means for causing the latter to lock with the plate and prevent backward rocking of the back portion upon such upward movement thereof, and a manually operable second means effective for moving said plate-engaging means downwardly and thereby releasing the back portion for rearward rocking.

10. A chair assembly as in claim 9, in which the frame

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has transverse guideway means, and the plate is carried on the guideway means and thereby held against rocking about the pivot axis but with a permissive transverse movement along the pivot axis, in which the said cooperative parts on the projections are upwardly convergent surfaces, and the said plate-engaging means are located for respective wedging between a surface of the plate and one of said surfaces upon upward actuation by said first moving means, and wherein the plate can adjust itself transversely under unequal forces exerted by said plate-engaging means for balancing said forces.

11. A chair assembly with a rockable back, comprising a seat portion and a back portion, the seat portion comprising a frame and a removable skirted seat for covering the frame, said back portion including a pivot member extending beneath the seat portion, pivot parts on the seat portion cooperative with the pivot member, said pivot member and parts being located between the side portions of the seat skirt and concealed by the seat when the latter is in place, a plate mounted on the seat portion for lateral movement and restrained from rocking movement with the back portion, opposed friction devices on the back portion for engaging said plate at opposed surfaces thereof, manually operable means for controlling the engagement of said friction devices, a sleeve connected to the frame, a compression spring in the sleeve, a radially projecting arm on said pivot member, and a link connected to the arm for compressing the spring when the back portion is rocked backward relative to the seat portion.

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