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P. S. FLETCHER  
ADJUSTABLE CHAIRS

2,914,112

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3 Sheets-Sheet 1

Fig. 1.

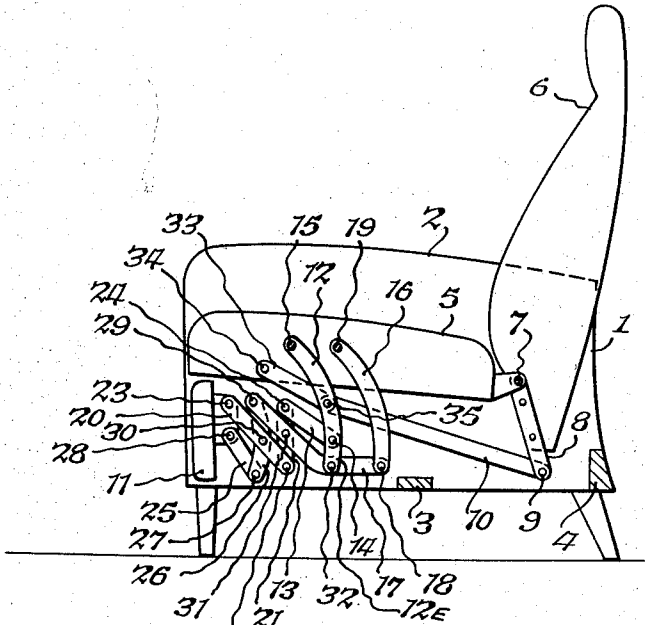


Fig. 2a.

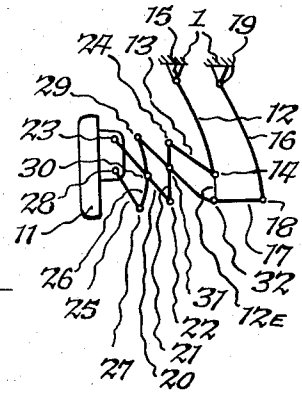
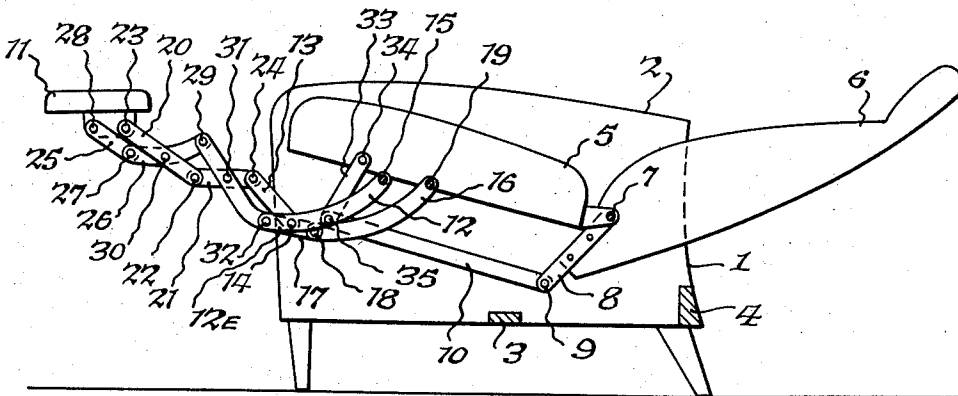


Fig. 2.



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3 Sheets-Sheet 2

Fig. 3.

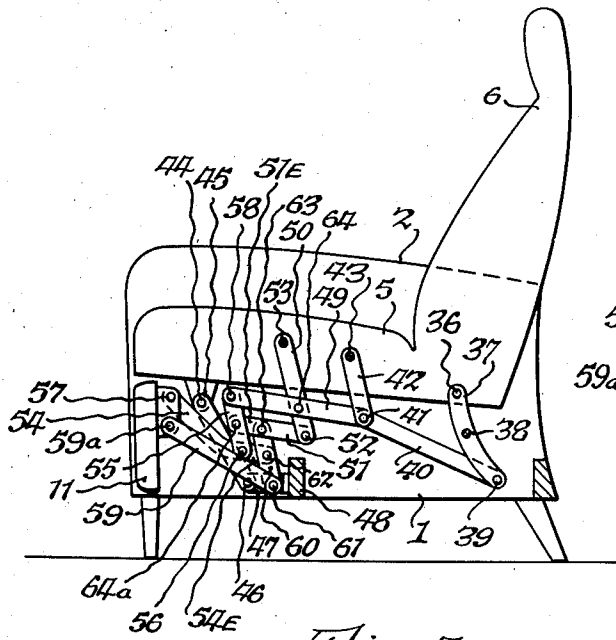


Fig. 4a.

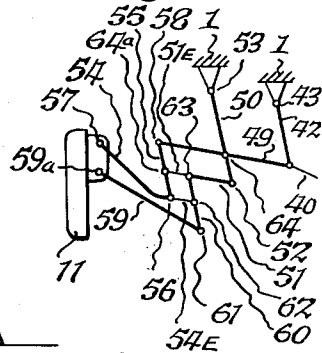
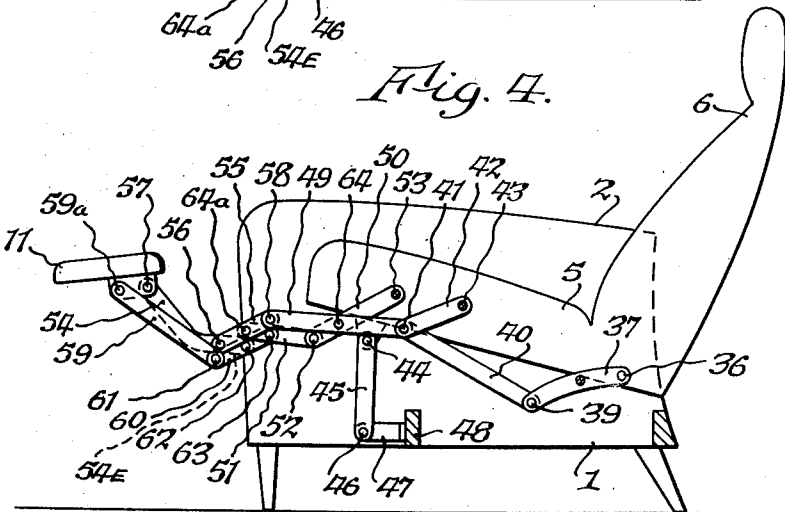


Fig. 4.



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3 Sheets-Sheet 3

Fig. 6a.

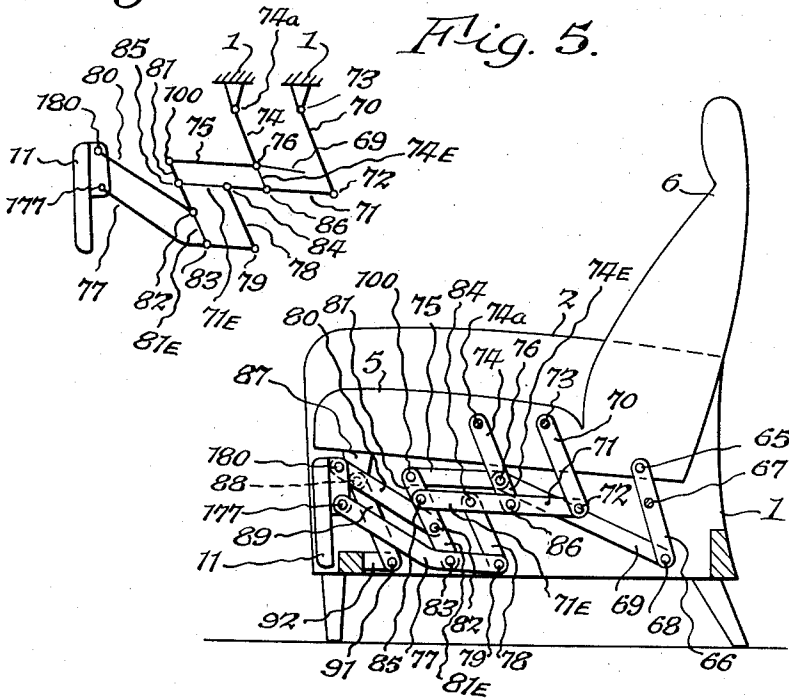
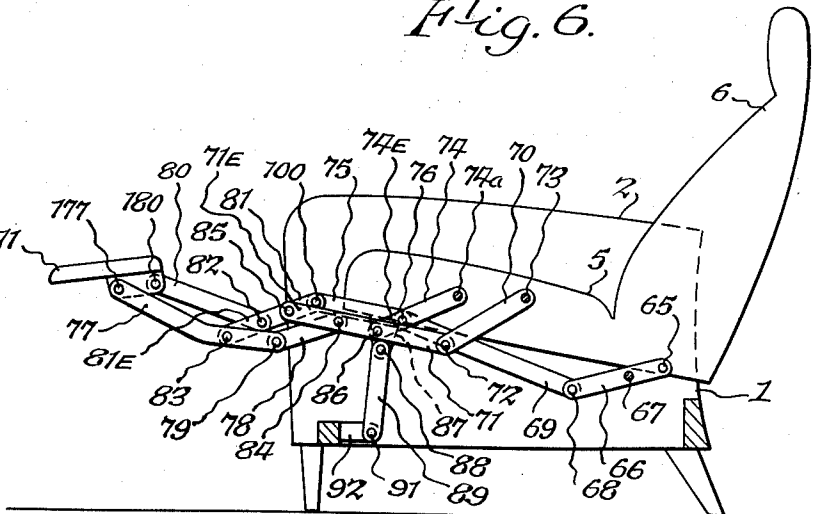


Fig. 5.

Fig. 6.



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1

2,914,112

## ADJUSTABLE CHAIRS

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Application February 9, 1956, Serial No. 564,476

5 Claims. (Cl. 155—106)

This invention relates to adjustable chairs and particularly to those which have a leg rest that is moved from an inactive position beneath the seat into a position in front of the seat when the chair is adjusted into a tilted position.

An object of this invention is to provide an improved chair that may be selectively operated between sitting and tilted positions, which will have improved mechanism for moving the leg rest between its active, leg-supporting position and its inactive position, whenever the chair is adjusted between sitting position and tilted position.

Another object of the invention is to provide an improved lazy tong linkage device for adjustable chairs, with which the leg rest may be elevated into leg-supporting position or lowered by extension or retraction of the lazy tong device selectively as the chair is adjusted between its sitting and tilted positions, with which the linkage will be relatively compact, simple, effective, practical and inexpensive.

A further object of the invention is to provide an improved and simple lazy tong mounting for a leg rest of a reclining chair which not only will move the leg rest upwardly and forwardly into effective position, but will position it well in front of the seat so as to more comfortably support the legs of tall people.

Other objects and advantages will be apparent from the following description of several embodiments of the invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings:

Fig. 1 is a vertical, sectional elevation through a chair constructed in accordance with this invention, the section representing a side elevation of the chair, with the side piece toward the observer removed to show the linkage on the interior of the chair at each side of the seat, the chair having its back rest and seat disposed in normal, sitting positions;

Fig. 2 is a similar sectional elevation, but with the parts adjusted into the tilted positions;

Fig. 2a is a schematic diagram illustrating the principle of the linkage which is incorporated in the chair shown in Figs. 1 and 2;

Fig. 3 is a sectional elevation generally similar to Fig. 1, but with the seat and back rest formed into a unit, and in sitting position, and with a modified form of lazy tong linkage that mounts the leg rest;

Fig. 4 is a view similar to Fig. 3 but with the parts in their tilted positions;

Fig. 4a is a schematic diagram illustrating the linkage employed in the chair shown in Figs. 3 and 4;

Fig. 5 is a view similar to Fig. 3, but illustrating a still different type of linkage which supports the leg rest;

Fig. 6 is a view similar to Fig. 5, but illustrating the parts in their tilted positions; and

Fig. 6a is a schematic diagram illustrating the linkage which is incorporated in the chair shown in Figs. 5 and 6.

In the embodiment of the invention illustrated in Figs. 1 and 2, the chair includes a support 1 having side pieces

2

2 connected by frame members 3 and 4. Disposed on the support 1 between the side pieces 2 are a seat 5 and back rest 6, both of which are pivotally supported on a common pivot rod 7 which is carried by the support. Thus, the seat 5, at its rear edge, is pivotally supported on the rod 7, and the back rest 6 is rockably mounted by the same rod 7, but extends slightly below the rod 7. An arm 8 depends from the lower end of the back rest 6 below the pivot rod 7 and at its lower end it is pivotally connected by a pin 9 to one end of an actuating link 10. A leg rest 11 is disposed between the side pieces 2 beneath the forward edge of the seat 5, and is supported at each end on a lazy tong device which is formed of four pairs of links at each side of the seat 5, which pairs are operatively interconnected with each other by three connections.

Links 12 and 13, which are hinged together at 14, comprise one of the four pairs of links, and the link 12 is pivotally connected by a pin 15 to the support 1. Links 16 and 17, which are hinged together at 18, comprise a second pair of links at each side of the seat, and the link 16 is pivotally connected by a pin 19 to the support 1. Links 20 and 21, which are hinged together at 22, comprise another set of links at each side of the seat, and link 20 is pivotally connected by a pin 23 to the leg rest 11. The link 21 is pivotally connected by a pin 24 to the link 13. Links 25 and 26, which are hinged together at 27, form still another or fourth pair of links. The link 25 is pivotally connected by pin 28 to the leg rest 11 below the pivot 23, and the link 26 is connected at its end opposite from the hinge 27 by pin 29 to an end of the link 17.

The links 20 and 26 are also pivotally connected together intermediate of their ends by a pivot pin 30. The link 17 is pivotally connected by a pin 31 to the link 21 intermediate of the ends of the latter. The link 12 extends beyond its hinge 14 and this extension 12E is pivotally connected by a pin 32 to the link 17 between the hinge 18 and the pivot pin 31. This completes a lazy tong device having four quadrilaterals of links connected together in tandem, with the leg rest 11 forming one end of this lazy tong device and the support 1 forming the other end of this lazy tong device, and providing the support for the entire lazy tong device.

A link 33 at one end is pivoted by pin 34 to the forward part of the seat 5, and at its other and lower end is pivotally connected by pin 35 to an end of the actuating link 10, and the pivot pin 35 is also pivoted to the link 12. Thus, when the back rest 6 is rocked on its pivot rod 7 from its sitting position, shown in Fig. 1, to the tilted position shown in Fig. 2, it will actuate the rod 10 endwise and move the link 33 endwise to elevate the forward part of the seat 5, and also rock the link 12 in a direction to extend the lazy tong linkage and elevate the leg rest 11 into the leg-supporting position shown in Fig. 2. Because of the four quadrilaterals of linkage which constitute the lazy tong device at each side of the seat 5, the leg rest 11 will be advanced to a maximum extent in front of the seat 5 and assume an approximately horizontal position, as shown in Fig. 2.

When the back rest 6 is returned to its upright or sitting position, the actuating link 10 will retract the lazy tong linkage and return the leg rest 11 to a position below the forward edge of the seat 5, and also lower the forward edge of the seat 5 into the position shown in Fig. 1. It will be observed that this linkage for the leg rest can be, and is very compact and occupies a relatively small space under the seat, yet when extended it moves the leg rest carried thereby a substantially long distance from the forward edge of the seat, so that people with long legs can have adequate and comfortable support for the legs. The leg rest 10 is relatively small in size and

3

hence can be disposed relatively high from the floor when in a sitting position, and the entire linkage of the lazy tong device is disposed well above the floor line so that the chair may have relatively high legs without the linkage mechanism showing below the support or frame of the chair. A small leg rest with a relatively long extension in front of the seat when the chair is in a reclined position has been long desired by designers and is desired also for comfort.

In the embodiment of the invention illustrated in Figs. 3 and 4, the back rest 6 and seat 5 are formed as a rigid unit, and this unit, at the bottom of the back rest portion, is pivotally supported at each side by a pin 36 on the upper end of a lever 37, one at each side of the seat, that is pivotally mounted on a common pivot rod 38 carried by the support. The lower end of each lever 37 is pivotally connected by a pin 39 to one end of an actuating link 40, one at each side of the seat, which link 40 is connected by pin 41 to the lower end of a link 42 that is pivotally supported by pin 43 on the support 1. The leg rest 11 is disposed below the forward edge of the seat 5 when the seat is in its normal sitting position, and it is also supported from the support 1 by four pairs of interconnected links at each side of the seat 5. In this embodiment the forward part of the seat 5 is pivotally connected by a pin 44 to the upper end of an upright link 45 whose lower end is pivoted by pin 46 on a lug 47 provided on a cross frame member 48 of the support. The link 45 is upwardly and forwardly inclined from the support when the seat 5 is in its normal, sitting position, but which moves into an upright position, preferably slightly past vertical, dead center position, when the seat is rocked into its tilted position.

The link 42, to which the link 40 was connected by pin 41, is also hinged by the pin 41 to another link 49, so that the links 42 and 49 form one pair of links at each side of the seat 5. Links 50 and 51, which are hinged together at 52, comprise a second pair of links at each side of the seat 5, and the link 50 is pivotally connected by pin 53 to the support 1. Links 54 and 55, which are hinged together at 56, form another pair of links at each side of the seat 5. The link 54 is pivotally connected by a pin 57 to leg rest 11, and the link 55 is pivotally connected by a pin 58 to an end of the link 49. A link 59 and a link 60, which are hinged together at 61, form a fourth pair of links at each side of the seat 5. The link 59 is pivotally connected to the leg rest 11 by a pin 59a. The link 54 extends beyond its hinge 56 and this extension 54E is connected by a pin 62 to the link 60 intermediate of the ends of the latter. The link 51 is pivotally connected to the link 60 by pin 63.

The link 51 is extended beyond its pivot 63 and that extension 51E is connected by pin 64a to link 55, intermediate of the ends of the latter. The links 49 and 50 are also pivotally connected together by pin 64. This completes a lazy tong arrangement at each side of the seat, of four quadrilaterals of linkage, and the lazy tong devices are connected to opposite ends of the leg rest 11 to support the latter and extend it upwardly and forwardly when the seat and back rest are moved into their normal, tilted positions. When the back rest and seat are tilted, by pushing them rearwardly from the sitting position shown in Fig. 3, this will rock the lever 37 into the position shown in Fig. 4, and this will move the actuating link 40 endwise, to the left in Fig. 3, which serves to extend the linkage of the lazy tong devices and elevate the leg rest 11 into the position shown in Fig. 4 in front of the forward edge of the seat 5.

At the same time the link 45 will move toward its upright position, just past the vertical dead center position, which elevates the forward edge of the seat 5 and serves as a support for the forward edge of the seat while the rear part of the seat is supported on the pivot rod 38. To return the chair to its upright position from the reclining position shown in Fig. 4, one merely pushes the back rest

4

and seat forwardly, during which the forward edge of the seat is lowered by movement of the guiding link 45 into its inclined position, and the rear part of the seat is elevated by the lever 37 as the latter moves into its upright position and slightly past dead center position.

In the embodiment of the invention shown in Figs. 5 and 6, the seat 5 and back rest 6 are formed in a rigid unit, as in Figs. 3 and 4, and the leg rest 11 is disposed beneath the forward edge of the seat 5 when the chair is in normal, sitting position. The bottom part of the back rest 6 is pivotally connected at each side by a pin 65 on the upper end of a lever 66, one at each side of the seat, which levers are pivoted on a common pivot rod 67 carried by the support. The lower end of the lever 66 is pivotally connected by a pin 68 to one end of an actuating link 69. Links 70 and 71, which are hinged together at 72, comprise one pair of links at each side of the seat 5, and the link 70 is pivotally connected by pin 73 to the support 1 so as to depend therefrom. Links 74 and 75, which are hinged together at 76, comprise another pair of links at each side of the seat 5. Link 74 is pivotally connected by pin 74a to the support 1. Links 77 and 78, which are hinged together at 79, form still another pair of links at each side of the seat.

Links 80 and 81, which are hinged together at 82, form a fourth pair of links at each side of the seat 5. Link 80 is pivotally connected to leg rest 11 by a pivot pin 180 and link 77 is pivotally connected to leg rest 11 by pivot pin 177. The link 81 is extended beyond its hinge 82 and the extension 81E is pivotally connected by a pin 83 to the link 77, intermediate the ends of the latter and this link 81 is also hinged by pin 100 to an end of link 75. The link 71 is hinged by pin 84 to an end of link 78, and extended beyond the pin 84 where the extension 71E is pivotally connected by a pin 85 to link 81, which serves as a pivotal connection between it and link 81. The link 74 extends beyond its hinge 76 and the extension 74E is pivotally connected by a pin 86 to a link 71 between the hinge 72 and the pivot pin 84. This, therefore, completes a lazy tong device at each side of the seat carried by the support 1 and mounting the leg rest 11 formed of four sets of quadrilateral linkages which are interconnected to form the lazy tong device.

The actuating link 69 at an end thereof is pivotally connected to link 74 by the hinge 76, so that when the seat 5 and back rest 6 are moved rearwardly from the Fig. 5 position to the Fig. 6 position, the lever 66 will be rocked clockwise in Fig. 5, which will push link 69 to the left and rock the link 74 clockwise in Fig. 5. This causes an extension of the related lazy tong device that advances and elevates the leg rest 11. The forward part of the seat has a depending lug 87 which is pivotally connected by a pin 88 to the upper end of a link 89 whose lower end is pivoted by pin 91 to a lug 92 on a frame member of the support 1. When the seat and back rest move rearwardly into the Fig. 6 position, the link 89, which was normally inclined upwardly and forwardly in the sitting position of the chair, moves into an upright position and slightly past vertical, dead center position, to elevate the forward edge of the seat 5 at the same time that the rear part of the seat 5 and lower part of the back rest 6 move downwardly and rearwardly, due to rocking of the lever 66. This positions the seat and back rest in tilted positions at the same time that the lazy tong device at each side of the seat advances and elevates the leg rest 11.

When the seat and back rest are returned to the sitting positions of Fig. 5, by moving them forwardly from the Fig. 6 position, the pin 65 on the bottom of the back rest will move past vertical, dead center position above the pivot rod 67 and at the same time the guiding link 89 will lower the forward part of the seat rest 5. At the same time the rocking of the lever 66 will return link 69 to its Fig. 5 position during which it retracts the linkage of the lazy tong device and returns the leg rest 11 to its normal,

5

inactive position below the forward end of the seat 5, as shown in Fig. 5.

It will be observed that in all embodiments of the invention, there is a lazy tong linkage at each side of the seat 5, and each lazy tong device is connected to the leg rest 11, one device on each end thereof, so that the leg rest will be firmly supported throughout its movements between the sitting and tilted positions. Suitable stops, not shown, may be added to limit the movements of the seat and back rest.

In all of the illustrated embodiments of the invention, it will be noted that there are two links at each side of the chair, pivoted to the support at levels well above the lower face of the seat and depending approximately vertically therefrom in front and rear spaced, in generally parallel relation, and that such two depending links are pivotally connected to a coupling link, which is 17 in Figs. 1, 2 and 2a, 49 in Figs. 3, 4 and 4a, and 71 in Figs. 5, 6 and 6a. This coupling link extends forwardly and is coupled to some lazy tong linkage that mounts the leg rest. In Figs. 1, 2 and 2a these depending links 12 and 16 extend near to, but terminate above, the lower face of the support, and the support is mounted well above the floor by depending legs to provide a substantial space between the support and the floor, which space is not occupied by the linkage that operates the leg rest.

It will be understood that various changes in the details and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. An adjustable chair of the type having a support with relatively high legs depending from its lower face to provide a space of substantial height between the floor and the support, a seat and a back mounted on said support for movement between sitting and reclining positions, a leg rest normally disposed beneath the forward part of the seat and above the lower level of said support, said chair also having at each side thereof two links pivoted to said support at about the same level and well above the lower edge of the seat, and spaced apart forwardly and rearwardly of one another between the front and rear limits

6

of said seat, said links depending from their pivoted connections to said support in a generally parallel and vertical relation, a coupling link pivotally connecting the lower ends of said two links and extending forwardly of the foremost of said two links, one pair of links pivoted together with one link of the pair pivoted to a leg rest and the other link of that pair pivoted to the forward end of said coupling link, another pair of links pivoted together and having one of the links of that pair pivoted to said leg rest and the other link of that another pair pivoted to one end of a third link, the other end of said third link being pivoted to the forward said depending link at a point spaced from the connection of said forward depending link to said coupling link, and means connecting said back rest to one of said depending links for swinging said depending link forwardly and causing an elevation and advance of said leg rest when the back rest is moved into its reclining position.

2. The chair as set forth in claim 1, and link means articulately connected to the forward part of said seat and to one of said depending links, whereby when the back rest moves into its reclining position and causes a forward actuation of said depending links, the forward part of said seat will be elevated.

3. The chair as set forth in claim 1, wherein said depending links extend downwardly to proximity to but terminate above the lower face of said support, and said connecting means from the back rest to one of said depending links is articulately connected to that depending link intermediate of the pivotal connection of that depending link to said support and the connection of that same link to said coupling link.

4. The chair as set forth in claim 1, wherein said other link of said one pair is also pivotally connected to a link of said another pair of links.

5. The chair as set forth in claim 1, wherein said other link of said one pair crosses and is pivoted to that link of said another pair which is connected to the leg rest.

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