Dec. 15, 1953

A. LORENZ

2,662,582

RECLINING ARTICLE OF FURNITURE

Filed May 26, 1949

3 Sheets-Sheet 1

FIG. 1.

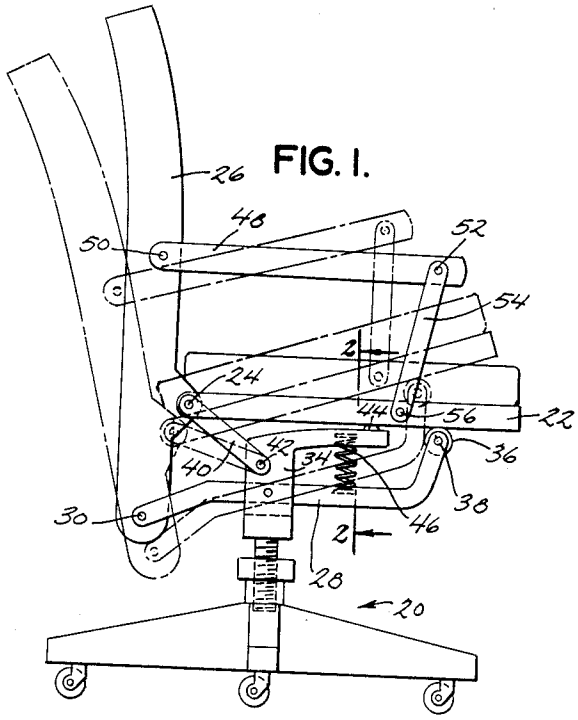


FIG. 2.

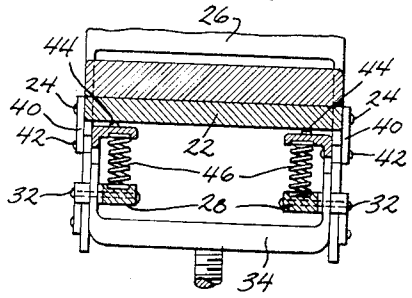
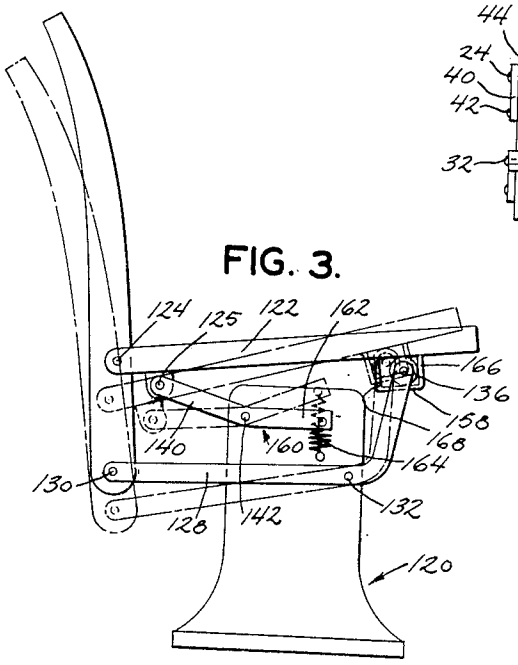


FIG. 3.



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FIG. 4.

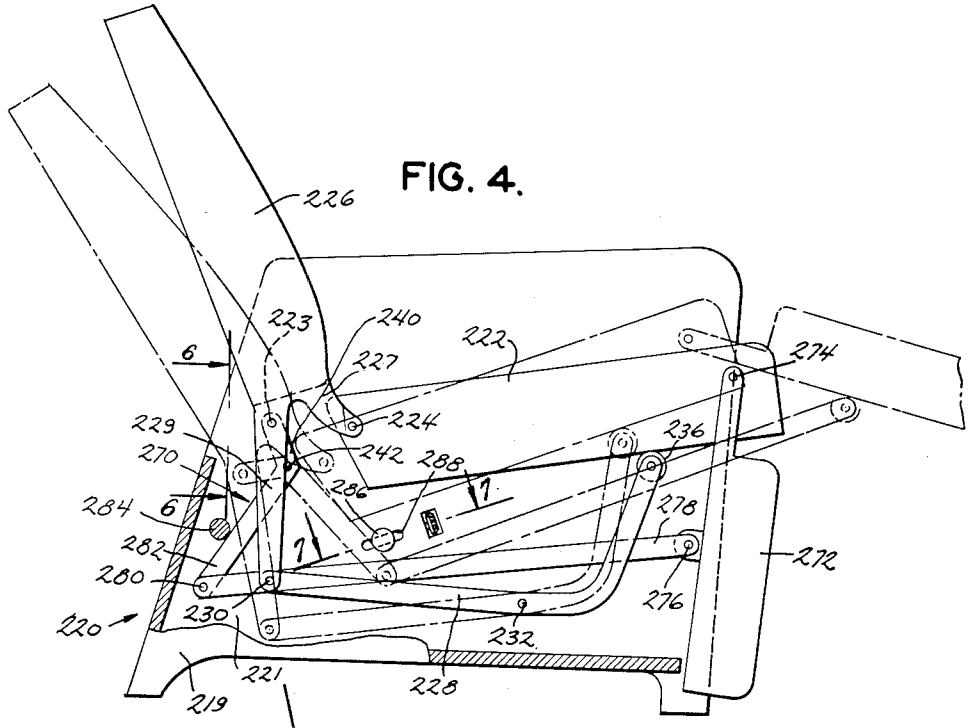


FIG. 5.

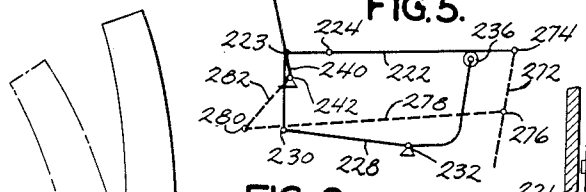


FIG. 6.

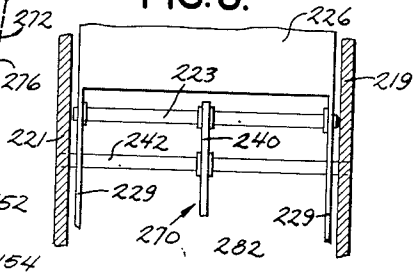


FIG. 9.

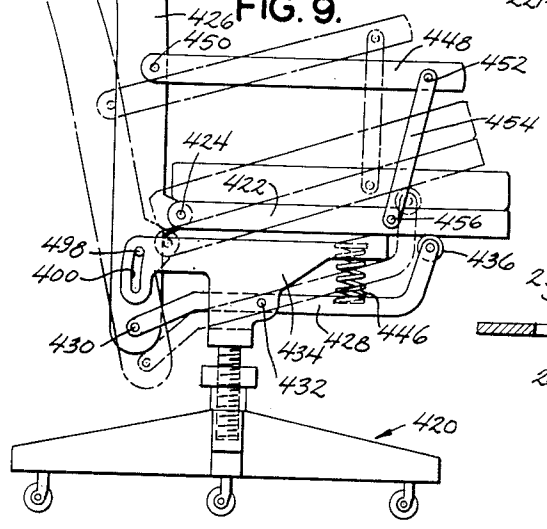
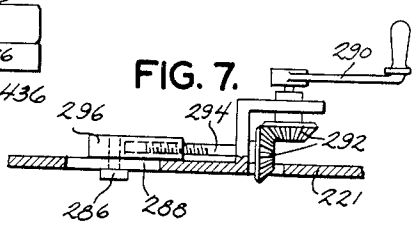


FIG. 7.



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FIG. 8.

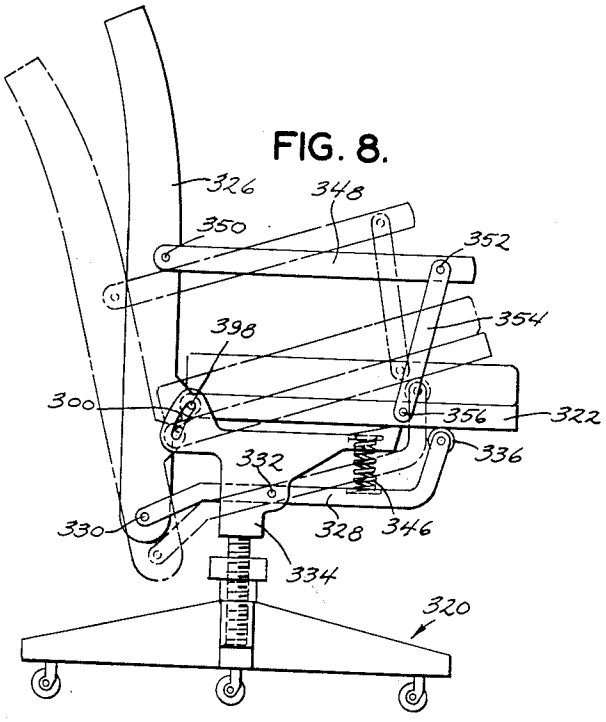


FIG. 10.

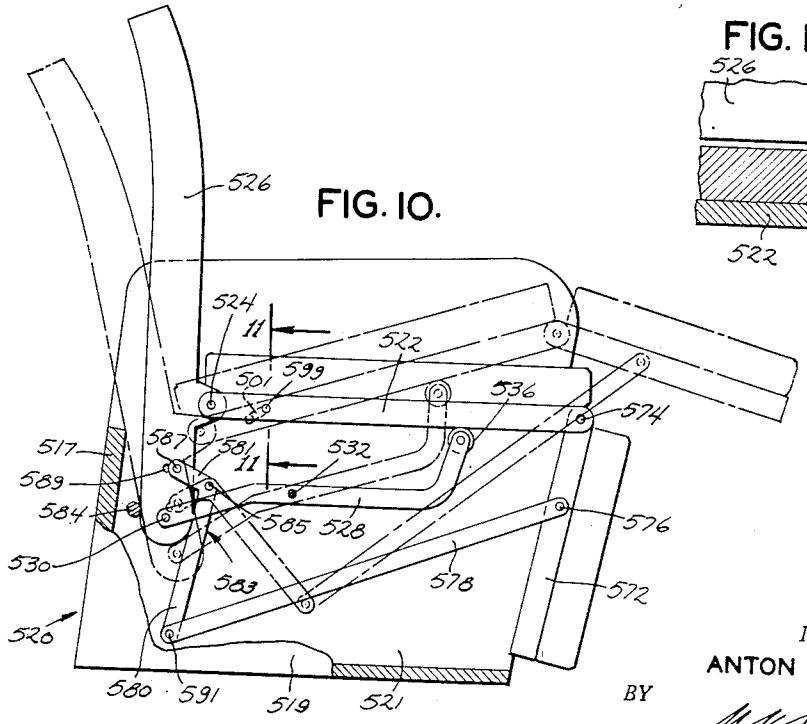
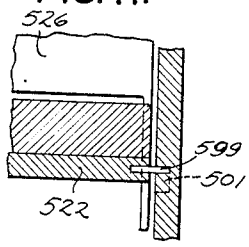


FIG. 11.



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UNITED STATES PATENT OFFICE

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RECLINING ARTICLE OF FURNITURE

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Application May 26, 1949, Serial No. 95,414

25 Claims. (Cl. 155—106)

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This invention relates to articles of furniture and more particularly to a reclining article of furniture.

An object of the present invention is to provide a reclining article of furniture wherein the seat and back-rest constituting movable links of a constrained complex linkage may be readily tilted from a sitting position into a reclined position.

Another object of the present invention is to provide a reclining article of furniture wherein the seat and back-rest constitute movable links of a constrained complex linkage or wherein a leg-rest swingably mounted on the seat may be propelled to a great extent during the initial tilting of the back-rest and the seat from the sitting position into a reclined position.

A further object of the present invention is to improve on the art of reclining articles of furniture as now ordinarily made.

With the above and other objects of the invention in view, the invention consists in the novel construction, arrangement and combination of various elements and parts, as described hereinafter and set forth in the claims hereof, certain embodiments of the same being described in the specification and being illustrated in the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a side elevational view of a tiltable office chair,

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1,

Fig. 3 is a side elevational view of another embodiment of a tiltable chair,

Fig. 4 is a side elevational view of an armchair, a portion of a side wall of the frame being broken away,

Fig. 5 is a simplified diagrammatical illustration of the link systems of the armchair shown in Fig. 4,

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4,

Fig. 7 is a sectional view taken on line 7—7 of Fig. 4,

Fig. 8 is a side elevational view of another embodiment of an office chair,

Fig. 9 is a side elevational view of still another embodiment of an office chair,

Fig. 10 is a side elevational view of an armchair, a portion of a side wall being broken away, and

Fig. 11 is a sectional view taken on line 11—11 of Fig. 10.

Referring now to Figs. 1 and 2, 20 generally

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indicates a support of an office chair, said support being in the shape of a customary pedestal.

The rear end portion of a seat 22 is pivoted at 24 to a back-rest 26, a portion of which extends below the plane of said seat. Said seat and back-rest thus form a pair of pivotally connected links. On each side of the office chair, the rear end portion of a lower link 28 arranged below the plane of the seat 22 is pivoted to the downwardly extending portion of the back-rest 26 at 30. Each of said lower links 28 is pivoted at 32 to an adjustable bracket 34 of the pedestal or support 20. A roller 36 is rotatably mounted at 38 at the front end of each lower link 28. Said roller 36 is in shiftable engagement with the lower surface of the seat 22. Furthermore, on each side of the chair, one end of a guiding link 40 is pivoted to the bracket 34 of the support 20 at 42. The other end of said guiding link 40 is pivoted to the back-rest 26 at 24 in coaxial alignment with the pivotal connection between the back-rest 26 and the seat 22. Thus, the office chair comprises a constrained complex linkage having a plurality of movable links and a stationary link. A portion of the support between the pivots 32 and 42 is included in said constrained complex linkage as said stationary link. The movable links of the constrained complex linkage include the seat 22, the back-rest 26, the lower link 28 and the guiding link 40.

The sitting position of the movable links of the constrained complex linkage shown in full lines is limited by stops 44 arranged on forward extensions of the bracket 34 for abutting engagement with the seat 22. Compression springs 46 arranged between said forward extensions of the bracket 34 and the lower links 28 act as a load on said lower links and tend to urge the movable links of the article of furniture into the sitting position.

When the user of the chair presses against the back-rest 26, the movable links of the chair may be brought against the action of the springs 46 from the full line sitting position into a reclined position, for example into the reclined position shown in dash and dot lines, whereby the back-rest 26 and the seat 22 are tilted to a certain extent. The movable members of the chair may be returned into the sitting position by shifting forwardly the weight of the person resting on the chair; the compression springs 46 acting as biasing means assist in the return of the movable members of the chair into the sitting position.

On each side of the chair the rear end portion of an arm-rest 48 is pivoted to the back-rest 26

at 50. The front end portion of the arm-rest 48 is pivotally connected at 52 with the upper portion of a bar 54, the lower portion of which is pivoted to the seat 22 at 56.

According to the embodiment of a chair shown in Fig. 3 the chair comprises a seat 122 pivoted to the back-rest 126 at 124. On each side of the chair, the downwardly extending portion of the back-rest 126 is pivoted at 130 to the rear end portion of a lower link 128 swingably mounted on the support 120 at 132. The front end portion of the lower link 128 carries a roller 136 engaged with a bracket 158 mounted on the lower surface of the seat 122. Said roller 136 is in shiftable engagement with the seat structure 122. A bell-crank lever 160 is swingably mounted on the support 120 at 142. The arm 140 of said bell-crank lever 160 acting as a guiding link is pivoted to the seat 122 at 125. The other arm 162 of said bell-crank lever 160 is connected with one end of a tension spring 164, the other end of which is fixed to a stationary point of the support 120.

Thus, the chair shown in Fig. 3 comprises again a constrained complex linkage. The guiding link 140, however, is pivoted to the seat 122 at 125 at a point spaced from the pivotal connection 124 between the back-rest 126 and the seat 122.

When the back-rest 126 is tilted from its sitting position into a reclined position, for example the reclined position shown in dash and dot lines, the remaining movable links of the chair are brought into the dash and dot line position whereby the seat 122 is tilted in dependence on the tilting of the back-rest 126. The spring 164 has the tendency to return the movable links of the chair into the sitting position.

The sitting position of the movable members of the chair is limited by an abutment of the roller 136 against the wall 166 of the bracket 158 acting as a stop. The extreme reclined position of the movable links of the chair is limited by an abutment of said roller 136 against the wall 168 of said bracket 158 likewise acting as a stop.

According to the embodiment shown in Figs. 4–7, the support 220 comprises connected side frames 219 and 221, the upper portions of which constitute the armrests of the armchair.

On each side of the chair, the rear end portion of the seat 222 is pivoted at 224 to lugs 227 rigidly connected with the back-rest 226. Lower extensions 229 of the back-rest, in rigid connection with the latter, extend downwardly on each side of the chair and are pivoted at 230 to rear end portions of lower links 228. Each lower link 228 is swingably mounted at 232 on a stud secured to the side frame of the support 220. The front end portion of each lower link carries a roller 236 shiftably engaged with the lower surface of the seat 222. An arm 240 of a bell-crank lever 270 swingably mounted on a transverse rod 242 of the support is rotatably engaged with a transverse rod 223 connecting the downward extensions 229 of the back-rest 226 with each other. As may be gathered from Fig. 6 said bell-crank lever 270 is arranged in the center of the chair. The arm 240 of said bell-crank lever 270 acts as a guiding link.

A leg-rest 272 swingably mounted on the front end of the seat 222 at 274 is pivotally connected at 276 with one end of a controlling link 278, the other end of which is pivoted at 280 to the arm 282 of the bell-crank lever 270. Said arm 282 constitutes a controlling element of the controlling mechanism connected with the leg-rest 272.

The sitting position (shown in full lines) of the armchair is limited by an abutment of the arm 282 of the bell-crank lever 270 against a transverse rod 284 of the support, which acts as a stop. The extreme reclined position (shown in dash and dot lines) of the movable members of the chair is limited by an abutment of said arm 282 of said bell-crank lever 270 against a stop 286. As best shown in Figs. 4 and 7 said stop 286 is slidable in a slot 288 of the side frame 221. The stop 286 may be adjusted in a desired position by means of a crank 290 connected to said stop through the medium of bevel-gears 292 and a shaft 294 screwed in to the bore of a member 296 connected with one end of the stop 286.

The leg-rest 272 connected with the guiding link 240 through its controlling mechanism 278, 282 constitutes a load acting on the movable links of the chair for returning same from a reclined position into the sitting position.

Fig. 5 illustrates in a somewhat simplified manner the constrained complex linkage of the arm-chair shown in Fig. 4. The link-system of the armchair includes the seat 222, the back-rest 226, the lower link 228 and the guiding link 240. The links 222, 226 and 228 are connected with each other at 224 and 230 respectively. The roller 236 of the lower link 228 is in shiftable engagement with the seat 222. The guiding link 240 swingable about the stationary point 242 is pivoted to the back-rest 226 at 223 at a point spaced from the pivotal connection 224 between the back-rest 226 and the seat 222. The leg-rest 272 swingably mounted on the seat 222 at 274 is pivoted to the controlling link 278 at 276, said controlling link 278 being pivoted at 280 to the controlling element 282 rigidly connected with the guiding link 240.

According to the embodiment of an office chair shown in Fig 8. a seat 322 is movably connected with a pin 398 carried by the back-rest 326, whereby a pair of pivotally connected links is formed. On each side of the chair a lower extension of the back-rest 326 is pivoted at 330 to a lower link 328 arranged below the plane of the seat 322 and swingably mounted at 332 on an adjustable bracket 334 of a pedestal or support 320. A roller 336 loosely and shiftably engaged with the seat 322 is rotatably mounted at the front end of each lower link 328.

On each side of the chair above-mentioned pin 398 of the back-rest 326 is slidably engaged with a slot 300 of the bracket 334 of the support 320. Said pin 398 and slot 300 constitute cooperating guiding means slidably engaged with each other.

Above described link-system constitutes a constrained complex linkage. The sitting position of the movable links of said constrained complex linkage is limited by an abutment of the seat 322 against forwardly projecting arms of the bracket 334. Compression springs 346 arranged between each of said forwardly projecting arms of the bracket 334 and each of the lower links 328 tend to urge the movable links of the chair into the sitting position shown in full lines. When the user of the chair tilts the back-rest 326 backwardly into a reclined position, for example into the position shown in dash and dot lines, the seat 322 is also tilted into the position shown in dash and dot lines. The movable members of the chair may be returned from a reclined position into the sitting position when

the occupant of the chair relieves the pressure on the back-rest and shifts his weight somewhat forwardly. The compression springs 346 acting as a load on the lower links 328 assist in the return of the movable members into the sitting position.

The chair is provided at each of its sides with an arm-rest 348 pivoted to the back-rest 326 at 350 and pivoted to a bar 354 at 352. The bar 354 is swingably mounted on the seat 322 at 356.

According to the embodiment of an office chair shown in Fig. 9, the seat 422 is pivoted to the back-rest 426 at 424. The back-rest is pivoted at 430 to the lower link 428, the latter is swingably mounted on the bracket 434 of the support 420 at 432 and carries at its front end a roller 436 shiftably engaged with the lower surface of the seat 422. According to Fig. 9, however, the pivot 408 of the back-rest 426 slidably engaged with the slot 400 of the bracket 434 is spaced from the pivotal connection 424 between the back-rest 426 and the seat 422.

Compression springs 446 arranged between the bracket 434 and each of the lower links 428 tend to urge the movable members of the chair into the sitting position limited by an abutment of the seat 422 against the forwardly extending arms of the bracket 434.

The rear end of the arm-rest 448 is pivoted at 450 to the back-rest 426. The front end of said arm-rest 448 is pivoted at 452 to a bar 454 pivoted at its other end to the seat 422 at 456.

The armchair shown in Figs. 10 and 11 has a support 520 comprising connected side frames 519 and 521. The back-rest 526 is pivoted at 524 to the rear portion of the seat 522 and at 530 to the rear portion of lower links 528 swingably mounted on the support 520 at 532. The upwardly extending front end of each lower link 528 carries a roller 536 loosely and shiftably engaged with the seat 522.

As shown in Figs. 10 and 11, on each side of the chair, the seat 522 is provided with a pin 599 projecting from the side of the seat. Each pin spaced from the pivotal connection 524 between the back-rest 526 and seat 522 is slidably engaged with a recess or slot 501 arranged on a side frame of the support 520.

The sitting position of the movable members of the chair is limited by a stop 584 arranged on the support for cooperation with the back-rest 526. The extreme reclined position of the movable members of the chair is limited by the rear wall 517 of the support against which the back-rest 526 may abut.

On each side of the chair one arm 581 of a bell-crank lever 583 swingably mounted on the support 520 at 585 is in engagement with the back-rest 526. According to the embodiment shown in Fig. 10, said arm 581 carries a pin 587 slidably and rotatably engaged with a slot 589 of the back-rest.

The other arm 580 of the said controlling bell-crank lever 583 is pivoted at 591 to the rear end portion of a controlling link 578, the front end of which is pivoted at 576 to a leg-rest 572 swingably mounted on the seat 522 at 574.

When the back-rest 526 and seat 522 are brought from the sitting position shown in full lines into a reclined position shown in dash and dot lines, the leg-rest is propelled from the position shown in full lines into the position shown in dash and dot lines by means of the controlling mechanism 583, 578 connected with the leg-rest and the back-rest. The slot 589 on the back-rest

can be omitted and the arm 581 of the bell-crank lever 583 can be pivoted to the back-rest, if the slot 501 guiding the pin 599 of the seat 522 is of such a shape that a pivot connecting the back-rest 526 with the arm 581 of the controlling bell-crank lever 583 is moved along a circular path, the center of which coincides with the axis of the pivot 585.

The controlling mechanism 583, 578 permits a swinging movement of the leg-rest 572 about its pivot 574 to a great extent although the back-rest 526 may be tilted only slightly.

The leg-rest 572 connected to the back-rest 526 through its controlling mechanism 583, 578 acts as a load on the movable links of the chair and contributes to a return movement of said movable links from a reclined position into the sitting position.

I have described preferred embodiments of my invention but it is understood that this disclosure is for the purpose of illustration and that various omissions or changes in shape, proportion and arrangement of parts, as well as the substitution of equivalent elements for those herein shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, and guiding means connected to said support and engaged with at least one link of said pair of pivotally connected links.

2. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, guiding means connected to said support and engaged with at least one link of said pair of pivotally connected links, and biasing means connected with a link of the article, said biasing means being operative to urge the movable links of the article from a reclined position towards the sitting position.

3. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, guiding means connected to said support and engaged with at least one link of said pair of pivotally connected links, and stopping means arranged on said article for cooperation with a movable link thereof so as to limit an extreme position of said movable links, said stopping means being adjustable.

4. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link ar-

ranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, guiding means connected to said support and engaged with at least one link of said pair of pivotally connected links, a leg-rest swingably mounted at the front end portion of the seat, and controlling means responsive to movements of said movable links of the article, said controlling means being connected to said swingable leg-rest for controlling movements of the latter.

5. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, guiding means connected to said support and engaged with at least one link of said pair of pivotally connected links, a leg-rest swingably mounted at the front portion of the seat, a controlling element swingably mounted on said support and connected to one of said links, and a controlling link connected to said controlling element and to said leg-rest for controlling movements of the latter.

6. In a reclining article of furniture as claimed in claim 5, said controlling element being in the shape of a bell-crank lever.

7. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, and a guiding link swingably mounted on said support and pivoted to at least one link of said pair of pivotally connected links.

8. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, a guiding link swingably mounted on said support and pivoted to at least one link of said pair of pivotally connected links, and biasing means connected with a link of the article, said biasing means being operative to urge the movable links of the article from a reclined position towards the sitting position.

9. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, a guiding link swingably mounted on said support and pivoted to at least one link of said pair of pivotally connected links, and resilient means acting on one of the links of the article for moving its movable links from a reclined position towards the sitting position.

10. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted at an intermediate point of its length upon said support the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, a guiding link swingably mounted on said support and pivoted to at least one link of said pair of pivotally connected links, a leg-rest swingably mounted at the front end portion of the seat, a controlling element swingably mounted on said support and rigidly connected with said guiding link, and a controlling link pivoted to said controlling element and to said leg-rest.

11. In a reclining article of furniture as claimed in claim 7, said guiding link being pivotally connected with said back-rest in coaxial alignment with the pivotal connection between said back-rest and said seat.

12. In a reclining article of furniture as claimed in claim 7, said guiding link being pivotally connected with said back-rest in coaxial alignment with the pivotal connection between said back-rest and said seat, and resilient means arranged between said support and one of the links of the article for moving its movable links from a reclined position towards the sitting position.

13. In a reclining article of furniture as claimed in claim 7, said guiding link being pivotally connected to said seat at a point spaced from the pivotal connection between the back-rest and the seat.

14. In a reclining article of furniture as claimed in claim 7, said guiding link being pivotally connected to said seat at a point spaced from the pivotal connection between the back-rest and the seat, and resilient means arranged between said support and said guiding link for moving the movable links of the article from a reclined position towards the sitting position.

15. In a reclining article of furniture as claimed in claim 7, said guiding link being pivotally connected to said back-rest at a point spaced from the pivotal connection between the back-rest and the seat.

16. In a reclining article of furniture as claimed in claim 7, said guiding link being pivotally connected to said back-rest at a point spaced from the pivotal connection between the back-rest and the seat, a leg-rest swingably mounted at the front end portion of the seat, a controlling element swingably mounted on said support and rigidly connected with said guiding link, and a controlling link pivoted to said controlling element and to said leg-rest.

17. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted on said support at an intermediate point thereof, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, and cooperating guiding means slidably engaged with each other and arranged

on said support and at least one of the links of said pair of pivotally connected links.

18. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted on said support at an intermediate point thereof, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, cooperating guiding means slidably engaged with each other and arranged on said support and at least one of the links of said pair of pivotally connected links, and biasing means connected with a link of the article, said biasing means being operative to urge the movable links of the article from a reclined position towards the sitting position.

19. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted on said support at an intermediate point thereof, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, cooperating guiding means slidably engaged with each other and arranged on said support and at least one of the links of said pair of pivotally connected links, and resilient means acting on one of the links of the article for moving its movable links from a reclined position towards the sitting position.

20. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted on said support at an intermediate point thereof, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, cooperating guiding means slidably engaged with each other and arranged on said support and at least one of the links of said pair of pivotally connected links, a leg-rest swingably mounted at the front end portion of the seat, and controlling means connected to one of said movable links of the article and to said leg-rest for controlling the movements of the latter.

21. A reclining article of furniture comprising: a support, a pair of pivotally connected links including a seat and a back-rest, a lower link arranged below the plane of the seat, said lower link being swingably mounted on said support

at an intermediate point thereof, the front end portion of said lower link being shiftably engaged with the front end portion of said seat, the rear end portion of said lower link being pivoted to said back-rest, cooperating guiding means slidably engaged with each other and arranged on said support and at least one of the links of said pair of pivotally connected links, a leg-rest swingably mounted at the front end portion of the seat, a double-arm controlling element swingably mounted on said support, one arm of said controlling element being in pivotal connection with said back-rest, and a controlling link in pivotal connection with the other arm of said controlling element and with said leg-rest.

22. In a reclining article of furniture as claimed in claim 17, a pin and slot connection between said support and said back-rest, said pin being spaced from the pivotal connection between the back-rest and the seat.

23. In a reclining article of furniture as claimed in claim 17, a pin and slot connection between said support and said back-rest, said pin being spaced from the pivotal connection between the back-rest and the seat, and resilient means arranged between said support and one of the links of the article for moving its movable links from a reclined position towards the sitting position.

24. In a reclining article of furniture as claimed in claim 17, a pin and slot connection between said support and said seat, said pin being spaced from the pivotal connection between the back-rest and the seat.

25. In a reclining article of furniture as claimed in claim 17, a pin and slot connection between said support and said seat, said pin being spaced from the pivotal connection between the back-rest and the seat, a leg-rest swingably mounted at the front end portion of the seat, a double-arm controlling element swingably mounted on said support, one arm of said controlling element being in pivotal connection with said back-rest, and a controlling link in pivotal connection with the other arm of said controlling element and with said leg-rest.

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