

Dec. 30, 1947.

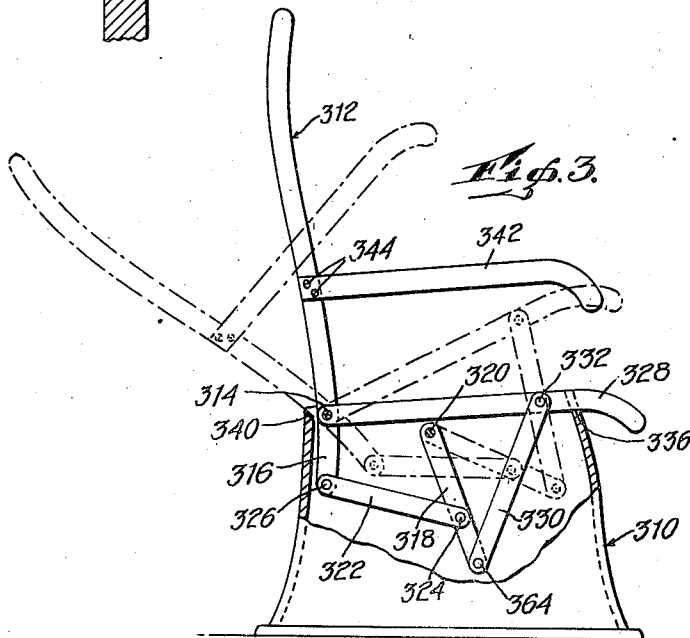
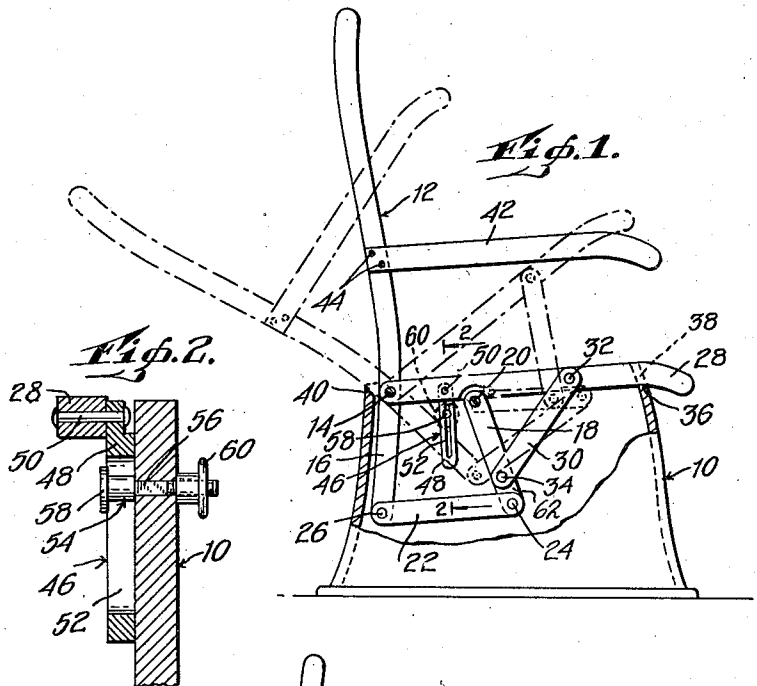
A. LORENZ

2,433,521

RECLINING ARTICLE OF FURNITURE

Filed March 1, 1945

2 Sheets-Sheet 1



INVENTOR
ANTON LORENZ
BY *Anton Lorenz*
ATTORNEY

Dec. 30, 1947.

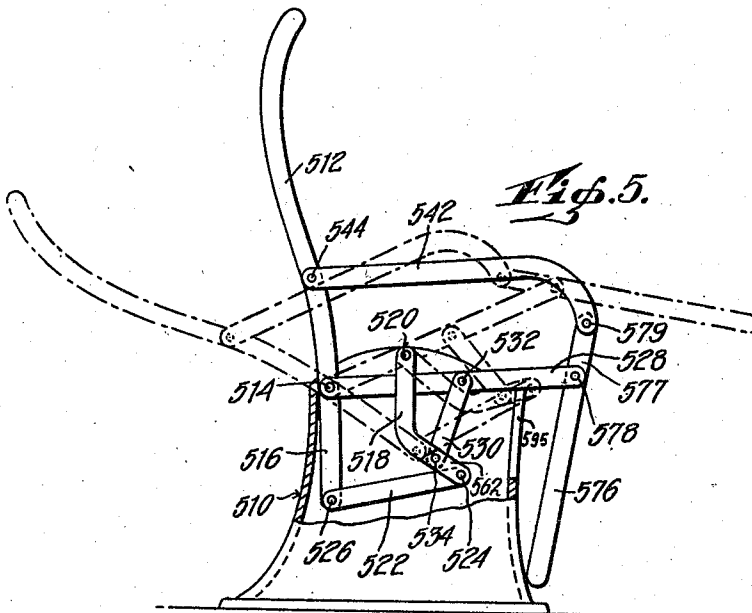
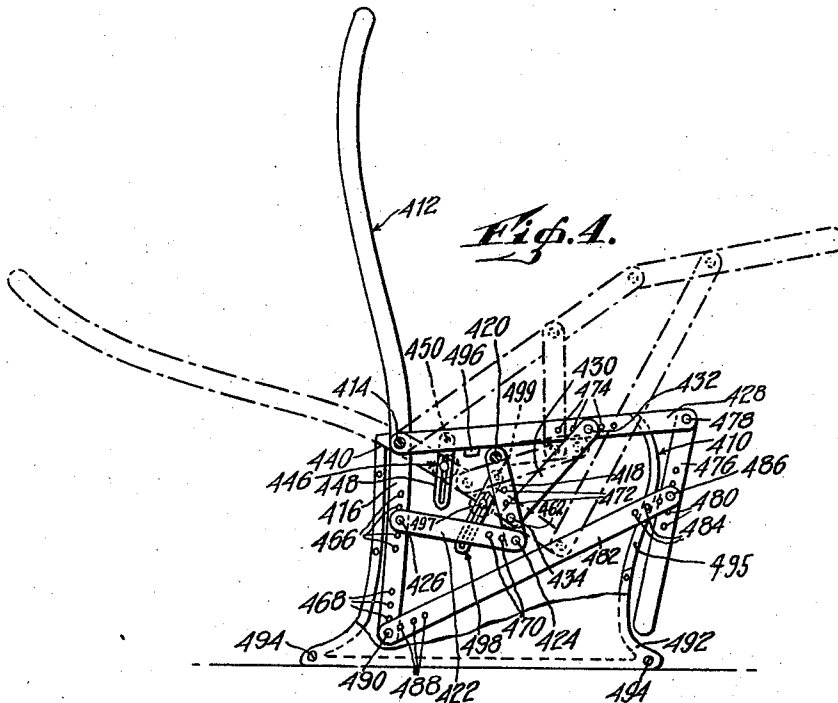
A. LORENZ

2,433,521

RECLINING ARTICLE OF FURNITURE

Filed March 1, 1945

2 Sheets-Sheet 2



INVENTOR
ANTON LORENZ
BY *[Signature]*
ATTORNEY

UNITED STATES PATENT OFFICE

2,433,521

RECLINING ARTICLE OF FURNITURE

Anton Lorenz, Buffalo, N. Y.

Application March 1, 1945, Serial No. 580,378

12 Claims. (Cl. 155-106)

1

My invention relates to articles of furniture, and more particularly to a reclining article of furniture wherein the seat and a downward extension of the back-rest form movable links of a polygonal compound linkage swingably mounted on a support, a portion of the latter forming the stationary link of said linkage.

An object of the present invention is to provide a reclining article of furniture wherein the change in the angle between the back-rest and the seat during a movement of said members may be readily adapted to the requirements of users of the article of furniture.

Another object of the present invention is to provide a reclining article of furniture of above described type with means, by which the user of the article of furniture may alter the inclination of the back-rest while the seat is held in a predetermined position.

A further object of the present invention is to provide a reclining article of furniture of above described type with means, by which the user of the article of furniture may alter the inclination of the seat while the back-rest is held in a predetermined position.

Still another object of the present invention is to provide a reclining article of furniture of above described type with means, by which the user of the article of furniture may alter the degree of the change in the inclination of the back-rest from the sitting position into the extreme reclining position while the degree of the change in the inclination of the seat from the sitting position into the extreme reclining position remains substantially unchanged.

A further object of the present invention is to provide a reclining article of furniture of above described type with means, by which the user of the article of furniture may alter the degree of change in the inclination of the seat from the sitting position into the extreme reclining position while the degree of the change in the inclination of the back-rest from the sitting position into the extreme reclining position remains substantially unchanged.

With the above and other objects of the invention in view, the invention consists in the novel construction, arrangement and combination of various devices, elements and parts, as 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 an adjustable reclining chair according to the invention,

2

a portion of the side wall of the support of the chair being broken away,

Fig. 2 is a sectional view of a locking device of the chair, shown in Fig. 1, taken on line 2-2 of Fig. 1, in an enlarged scale,

Fig. 3 is a side elevational view of another embodiment of an adjustable reclining chair according to the invention, a portion of a side wall of the support being broken away,

Fig. 4 is a side elevational view of a further embodiment of an adjustable reclining chair according to the invention, wherein said chair is provided with a leg-rest and with means for adjusting the relative position between the back-rest and the seat, a portion of a side cover of the casing forming the support being broken away, and

Fig. 5 is a side elevational view of still another embodiment of an adjustable reclining chair according to the invention, a portion of the side wall of the support being broken away.

Referring now to Figs. 1 and 2, 10 generally indicates a support in the shape of a casing, which may be of any suitable material, such as wood, metal, plastic or the like.

The rear end portion of a seat 28 is pivoted to the support 10 at 14. On each side of the chair, the upper end portion of a controlling link 30 is pivoted to the seat 28 at 32. The lower end portion of said controlling link 30 is pivotally connected at 34 with the lower portion of a guiding link 18, the upper portion of which is pivoted at 20 to the support 10 at a point spaced from the pivotal connection 14 between the seat 28 and the support 10. Thus, the seat 28, the controlling link 30, the guiding link 18 and the stationary portion of the support 10 between the pivotal connection 20 of the guiding link 18 with the support 10 and the pivotal connection 14 of the seat 28 with the support 10 form the links of a four-bar link-mechanism.

A back-rest 12 is pivoted to the seat 28 at 14 in coaxial alignment with the pivotal connection between the seat 28 and the support 10. Said back-rest 12 has a downward extension 16 projecting beyond the pivotal connection 14 of the back-rest 12 with the seat 28. According to Fig. 1 said downward extension 16 is integral with said back-rest 12. On each side of the chair, the rear end portion of a connecting link 22 is pivoted to the downward extension 16 of the back-rest 12 at 26 at a point below the pivotal connection 14 between the back-rest 12 and the seat 28. The front end portion of each connecting link 22 is pivoted at 24 to an extension 62

of the guiding link 18 projecting beyond the pivotal connection 34 of the guiding link 18 with the controlling link 30.

As will be apparent from above, the seat 28 and the downward extension 16 of the back-rest 12 form movable links of a polygonal compound linkage comprising the movable links 28, 30, 18—62, 22, 16 and the stationary link represented by the stationary portion of the support 10 between the pivots 14 and 20.

When the user of the chair leans the weight of his body against the back-rest 12 for moving same from its sitting position shown in full lines into the reclined position shown in dash and dot lines, the controlling link 30 pivotally connected with the guiding link 18—62, which in turn is connected with the downward extension 16 of the back-rest 22 through the medium of the connecting link 22, controls the movements of the seat 28, so that the latter is brought from its sitting position shown in full lines into its reclined position shown in dash and dot lines. During said movement of the members of the chair from the sitting position into the reclined position, the angle between the back-rest and the seat 28 is increased.

As will be readily understood, the degree of lifting the seat 28 depends on the length of the controlling link 30 and its connections with the guiding link 18 and the seat 28. For example, if the controlling link 30 were of shorter length and were connected with the guiding link 18 at a point above the pivot 34, the seat 28 would be lifted to a lesser degree when the proportions of above mentioned four-bar link system remain unchanged and the back-rest 12 is brought into the extreme reclined position shown in Fig. 1. In other words, owing to above described control of the seat 28 by the controlling link 30 pivoted to the guiding link 18, the designer of the chair has a wide range for obtaining different degrees of inclination of the seat and for obtaining different relative positions between the seat and back-rest in the reclined position so as to make the chair as comfortable as possible for various uses. Furthermore, it may be mentioned, that the arrangement of the movable members of the chair as described above permits a construction of the chair with very well balanced movable members, which may be easily brought from one position into another one. According to the embodiment of the chair shown in Fig. 1, the sitting position of the movable members of the chair is limited by the wall 36 of the recess 38 of the support 10 receiving the seat 28 in its sitting position. The extreme reclined position of the movable members of the chair is limited by the inclined wall 40 of the support 10 cooperating with the back-rest 12.

On each side of the chair an arm-rest 42 is rigidly secured to the back-rest 12 by screws 44 or the like.

A locking device generally indicated by 46 may be used for holding the movable members of the chair in any desired adjusted position. According to Figs. 1 and 2, said locking device 46 comprises a bar 48 swingably mounted on a frame member of the seat 28 at 50. Said bar 48 has a slot 52 for slidable engagement with a bolt 54 having a square portion 56 inserted into a corresponding square aperture of the support 10. The bolt 54 has on one of its ends a head 58 for engagement with a surface of the bar. A locking knob 60 is screwed onto the opposite threaded end of the bolt 54 projecting from the support

10. If the locking knob 60 is loosened, the bar 48 may be freely moved, so that the seat 28 and the other movable members of the chair connected with the seat may be brought into any desired position. If, however, the locking knob 60 is tightened, so that it clamps the bar 48 by means of the head 58 and the bolt 54 against the support 10, the seat and the movable members of the chair connected therewith are firmly held in their position.

Fig. 3 illustrates another embodiment of an adjustable reclining chair, wherein a back-rest 312 is pivotally connected with the seat 328 and the support 310 at 314. One end of a connecting link 322 is pivoted to a downward extension 316 of the back-rest 312 at 326, the other end of said connecting link 322 is pivoted at 324 to an intermediate point of a guiding link 318 swingably mounted on the support 310 at 320. One end of a controlling link 330 is pivoted at 364 to the guiding link 318; the other end of said controlling link 330 is pivoted at 332 to a seat 328 swingably mounted on the support 310 at 314. An arm rest 342 is rigidly secured to the back-rest 312 at 344. The sitting position of the movable members of the chair limited by the wall 336 is shown in full lines, while the extreme reclined position of the movable members limited by the stop 340 is shown in dash and dot lines.

The mechanism of the adjustable reclining chair shown in Fig. 4 is similar to the mechanism of the adjustable reclining chair shown in Fig. 1. According to Fig. 4 the back-rest 412 pivotally connected with the seat 428 and the support 410 at 414 has a downward extension 416. Said downward extension has a first series of holes 466 and a second series of holes 468. A pin 426 passing through a hole of the connecting link 422 is inserted into one hole of the series of holes 466 for a pivotal connection between the connecting link and the downward extension of the back-rest. The other end of said connecting link 422 being provided with a series of holes 470 is pivotally connected at 424 with the extension 462 of the guiding link 418 swingably mounted on the support 410 at 420. Said pivotal connection 424 between the connecting link 422 and the extension of the guiding link 418 is obtained by a pin passing through one of the holes of the series of holes 470 and inserted into a registering hole of the guiding link 418. Said guiding link 418 has a series of holes 472, and a pin 434 passing through a hole of the controlling link 430 may be inserted into one hole of said series of holes 472 for a pivotal connection between the controlling link 430 and the guiding link 418. The seat 428 pivotally mounted on the support 410 at 414 has a series of holes 474; a pin 432 passing through a hole of the controlling link 430 may be inserted into one hole of said series of holes 474 for a pivotal connection between the controlling link and the seat. A leg-rest 476 pivoted to the front portion of the seat 428 at 478 is provided with a series of holes 480. One end of a controlling member 482 is provided with a series of holes 484; said end of the controlling member 482 is pivotally connected with the leg-rest 476 by means of a pin 486 inserted into one hole of the series of holes 484 and into a hole of the series of holes 480. In a similar manner the other end of the controlling member 482 having a series of holes 488 is pivotally connected with the downward extension 416 of the back-rest 412 by means of a pin 490 fitting into one of the holes 468.

492 indicates a side wall of the support 410;

a substantial portion of said side wall 492 is detachably mounted on the casing forming the support 410 by means of screws 494, so that the user of the chair may have access to the mechanism of the chair after removal of said covering side wall 492 for a purpose to be described hereinafter. 495 indicates an aperture of the casing 410 for the passage of the controlling member 482.

The sitting position of the movable member of the chair is limited by a stop 496 arranged on the support 410 for cooperation with the seat 428, and the extreme reclined position of the movable members of the chair is limited by the inclined wall 440 cooperating with the back-rest.

The adjustable reclining chair shown in Fig. 4 is equipped with a first locking device generally indicated by 446 and a second locking device generally indicated by 498. Both locking devices are of the type shown in Fig. 2 and described above in connection with the chair shown in Fig. 1. The locking bar 448 of the first locking device 446 is swingably mounted on the seat 428 at 450, so that said locking device 446 is associated with the seat and the support; the locking bar 497 of the second locking device 498 is swingably mounted on the guiding link 418 at 499, so that the second locking device 498 is associated with said guiding link 418 and the support 410. If the movable members of the chair are connected with each other as shown in Fig. 4, they may be held in any desired adjusted position by tightening either one of the locking devices 446 or 498.

If the user of the chair wishes to have the back-rest at a different angle relative to the seat when the latter is in a certain position, he may hold the seat in said certain position by a tightening of the locking device 446. The other locking device 498 remains in loose condition. Now, the user of the chair may change the position of the pivotal connection 426 between the connecting link 422 and the downward extension 416 of the back-rest 412 by inserting the pin 426 into another hole of the series of holes 456, whereby the angle between the back-rest 412 and the seat 428 may be changed. If, furthermore, a change in the angle between the leg-rest and the seat is desirable, such an adjustment may be obtained by varying the position of the pivotal connection 432 and/or 490 by inserting the respective pins into other holes of the series of holes.

When the user of the chair wishes to have the seat in a different position relative to the back-rest when the latter is in a certain reclined position, the back-rest is held in said position by a tightening of the locking device 498, while the locking device 446 remains in loose condition. Now, the user of the chair may bring the seat into a different position relative to the back-rest by altering the position of the pivotal connection 432 and/or 434 by inserting the respective pins into another hole of the series of holes 474 and/or 472.

Above described change in the position of the back-rest 412 and/or the seat 428 causes a change in the degree of change of angularity between the back-rest and the seat during a movement from the sitting position into the reclined position. If the back-rest alone is adjusted in a different position, the degree of the change of inclination of the seat will remain substantially unchanged. If the seat alone is adjusted in a different position, the degree of the change of inclination of the back-rest will remain substantially unchanged.

Fig. 5 illustrates a different embodiment of an adjustable reclining chair according to the invention. The back-rest 512 pivotally connected with the seat 528 and the support 510 at 514 has a downward extension 516, pivotally connected with one end of the connecting link 522 at 526. The other end of said connecting link is pivoted at 524 to an extension 562 of a guiding link 518 swingably mounted on the support 510 at 520. The connecting link 522 may pass through a slot 595 of the support 520 when the members of the chair are displaced. One end of a controlling link 530 is pivoted to the guiding link 518 at 534 and the other end of said controlling link 530 is pivoted at 532 to a seat 528 swingably mounted on the support 510 at 514. As clearly shown in Fig. 5, the guiding link 518 is in the shape of a bent link.

A leg-rest 576 pivoted to the front portion of the seat 528 at 578 has an upward extension 577. One end of a controlling member 542 being in the shape of an arm-rest is pivoted to said upward extension 577 of the leg-rest at 579, the other end of said controlling member 542 or arm-rest is pivotally connected with the back-rest at 544.

The sitting position of the movable members of the adjustable reclining chair is shown in full lines. When the user of the chair leans the weight of his body against the back-rest 512, the movable members of the chair are brought into the reclined position shown in dash and dot lines in Fig. 5.

Above described Fig. 5 illustrates a further modification of the mechanism according to the invention by the use of a bent link for the guiding link 518, whereby a further variation in the degree of the change of the angle between the back-rest and the seat during a movement therefrom the sitting position into the reclined position is rendered possible.

I have described preferred embodiments of my invention, but it is understood that this disclosure is for the purpose of illustration, that the invention may also be applied to various other types of reclining articles of furniture such as garden chairs, chairs for use in railroad cars, chairs for use in airplanes, sofas, lounges, etc., 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.

I claim:

1. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said controlling link being pivoted to the front portion of said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connections of the guiding link with the support and of the seat with the support forming the links of a four-bar link-mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat and having a downward extension projecting beyond its pivotal connection with the seat, and a connecting link, the rear end of said connecting link being pivoted to said downward extension of the back-rest be-

4. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said controlling link being pivoted to the front portion of said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connections of the guiding link with the support and of the seat with the support forming the links of a four-bar link-mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat in coaxial alignment

7. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said controlling link being pivoted to the front portion of

9

said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connections of the guiding link with the support and of the seat with the support forming the links of a four-bar link-mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat and having a downward extension projecting beyond its pivotal connection with the seat, a connecting link, the rear end of said connecting link being pivoted to said downward extension of the back-rest below the pivotal connection between the back-rest and the seat, the front portion of said connecting link being pivoted to a point of the guiding link spaced from its pivotal connection with the controlling link, and means whereby the effective length of said connecting link may be varied and adjusted.

8. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said controlling link being pivoted to the front portion of said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connections of the guiding link with the support and of the seat with the support forming the links of a four-bar link-mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat and having a downward extension projecting beyond its pivotal connection with the seat, a connecting link, the rear end of said connecting link being pivoted to said downward extension of the back-rest below the pivotal connection between the back-rest and the seat, the front portion of said connecting link being pivoted to a point of the guiding link spaced from its pivotal connection with the controlling link, and locking means associated with said seat and said support for locking said seat in a predetermined position.

9. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said controlling link being pivoted to the front portion of said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connection of the guiding link with the support and of the seat with the support forming the links of a four-bar link-mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat and having a downward extension projecting beyond its pivotal connection with the seat, a connecting link, the rear end of said connecting link being pivoted to said downward extension of the back-rest below the pivotal connection between the back-rest and the seat, the front portion of said connecting link being pivoted to a point of the guiding link spaced from its pivotal connection with the controlling link, a leg-rest swingably mounted on the front portion of the seat, and

10

means for controlling the movements of said leg-rest in dependence on the the movements of a movable member of the article.

10. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said controlling link being pivoted to the front portion of said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connections of the guiding link with the support and of the seat with the support forming the links of a four-bar link-mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat and having a downward extension projecting beyond its pivotal connection with the seat, a connecting link, the rear end of said connecting link being pivoted to said downward extension of the back-rest below the pivotal connection between the back-rest and the seat, the front portion of said connecting link being pivoted to a point of the guiding link spaced from its pivotal connection with the controlling link, a leg-rest swingably mounted on the front portion of the seat, and a controlling member, said controlling member being pivoted at one of its ends to said downward extension of the back-rest, and said controlling member being pivoted at its other end to said leg-rest.

11. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said controlling link being pivoted to the front portion of said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connections of the guiding link with the support and of the seat with the support forming the links of a four-bar link-mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat and having a downward extension projecting beyond its pivotal connection with the seat, a connecting link, the rear end of said connecting link being pivoted to said downward extension of the back-rest below the pivotal connection between the back-rest and the seat, the front portion of said connecting link being pivoted to a point of the guiding link spaced from its pivotal connection with the controlling link, a leg-rest swingably mounted on the front portion of the seat, a controlling member, said controlling member being pivoted at one of its ends to said downward extension of the back-rest and at its other end to said leg-rest, and means whereby the effective length of said controlling member may be varied and adjusted.

12. A reclining article of furniture, comprising: a support, a seat pivoted to said support at its rear end portion, a guiding link, the upper portion of said guiding link being pivoted to said support at a point spaced from the pivotal connection between the seat and the support, a controlling link, the upper portion of said con-

11

trolling link being pivoted to the front portion of said seat, the lower end portion of said controlling link being pivoted to the lower portion of said guiding link, said seat, said controlling link, said guiding link and the stationary portion of the support between the pivotal connections of the guiding link with the support and of the seat with the support forming the links of a four-bar link mechanism, a back-rest, said back-rest being pivoted to the rear portion of said seat and having a downward extension projecting beyond its pivotal connection with the seat, a connecting link, the rear end of said connecting link being pivoted to said downward extension of the back-rest below the pivotal connection between the back-rest and the seat, the front portion of said connecting link being pivoted to a point of the guiding link spaced from its pivotal connection with the controlling link, a

12

leg-rest pivoted to the front portion of the seat, said leg-rest having an extension projecting beyond its pivotal connection with the seat, and a controlling member, one end of said controlling member being pivoted to said extension of the leg-rest, and the other end of said controlling member being pivoted to said back-rest.

ANTON LORENZ.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
704,459	Hanger	July 8, 1902
2,227,597	Luckhardt	Jan. 7, 1941
2,173,283	Lorenz et al.	Sept. 19, 1939