Oct. 7, 1952 A. LORENZ 2,612,937

RECLINING ARTICLE OF FURNITURE

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FIG. 1

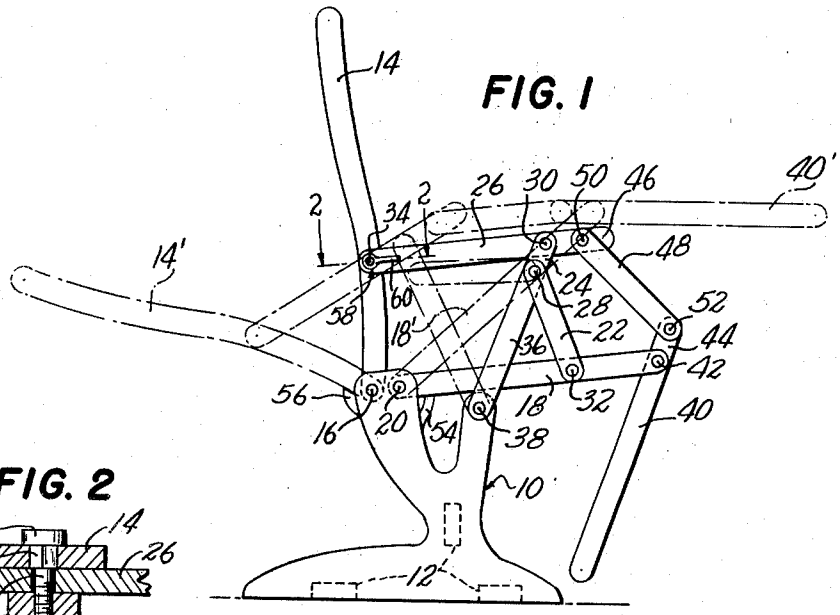


FIG. 2

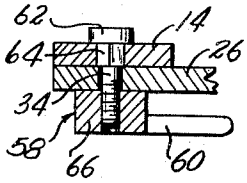
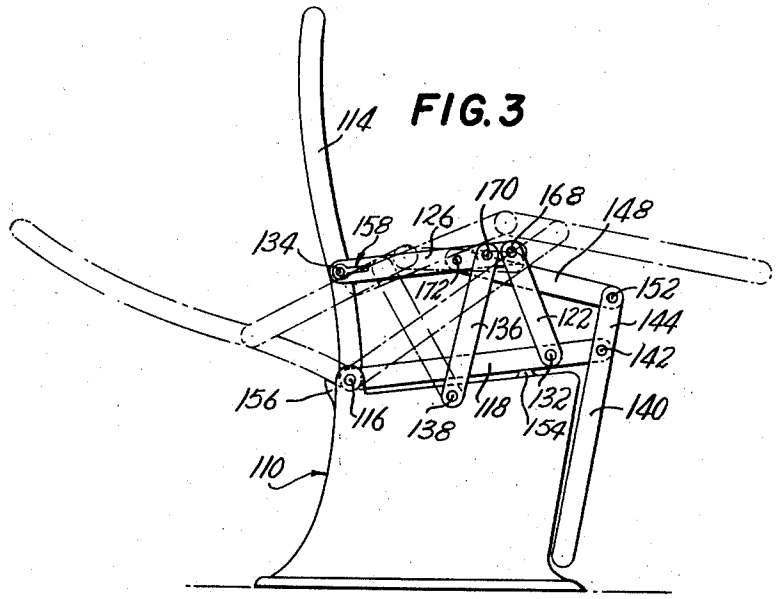


FIG. 3



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FIG. 4

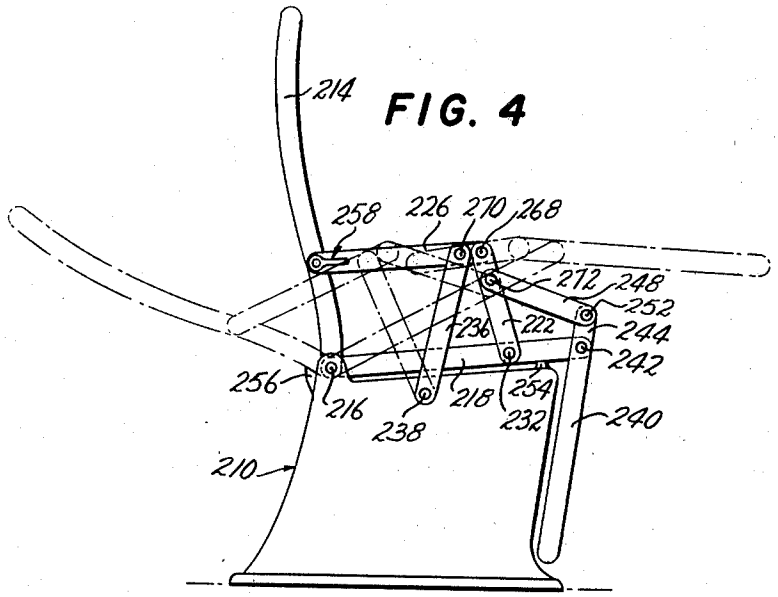
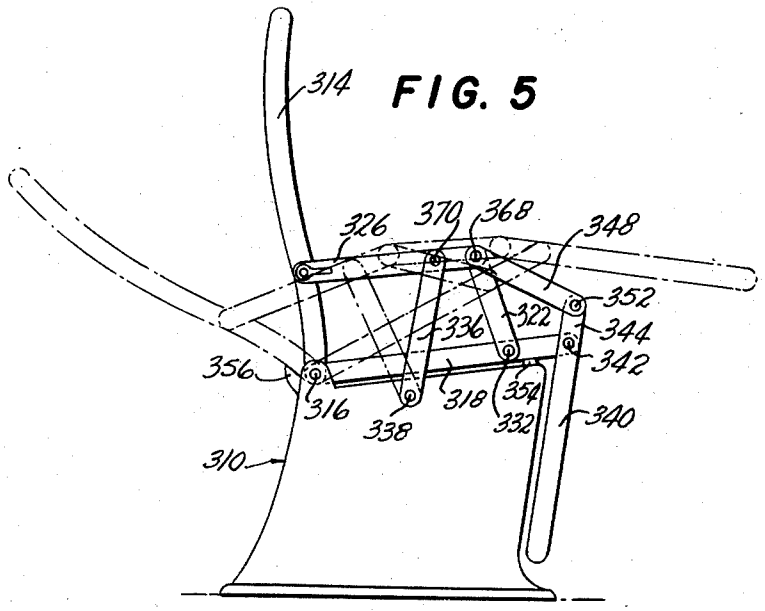


FIG. 5



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FIG. 6

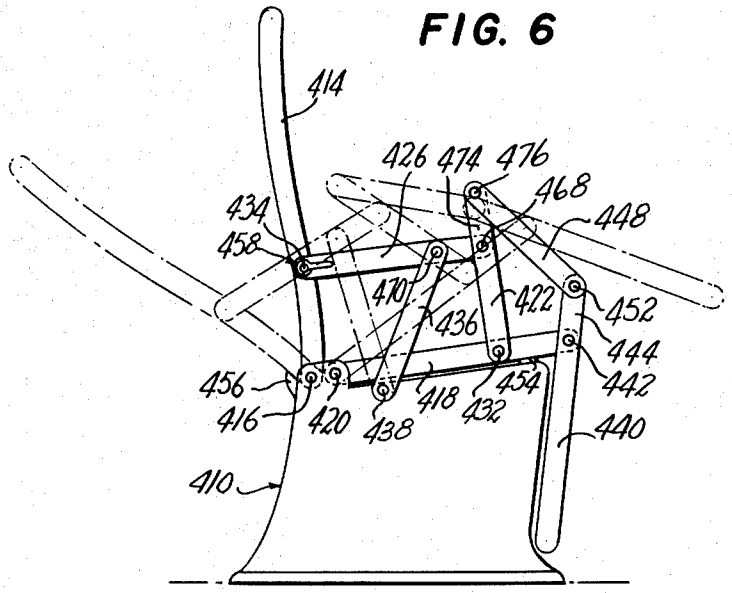
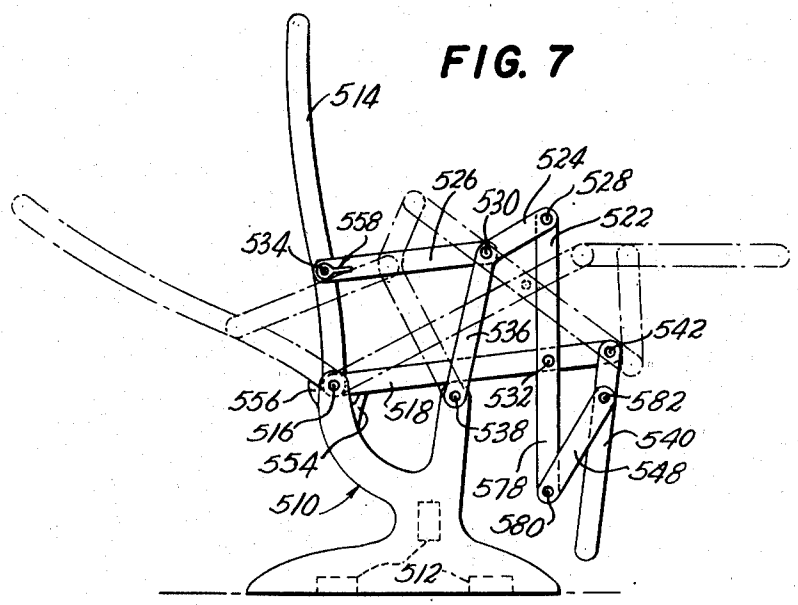


FIG. 7



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Patented Oct. 7, 1952

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UNITED STATES PATENT OFFICE

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RECLINING ARTICLE OF FURNITURE

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Application November 7, 1946, Serial No. 708,311

11 Claims. (Cl. 155—110)

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This invention relates to articles of furniture, and more particularly to reclining articles of furniture, wherein a seat, a back-rest and a link-chain composed of a plurality of connecting links form movable members of a link-system swingably mounted on a support, and wherein the movements of a leg-rest swingably mounted on the seat are controlled by a controlling mechanism in dependence on the movements of a member of said link-system.

An object of the present invention is to provide a new and useful controlling mechanism for the swingable leg-rest of a reclining article of furniture of above described type, by means of which the leg-rest may be readily brought into a substantially horizontal position, when the back-rest and seat are brought into an extreme reclined position.

A further object of the present invention is to improve on reclining articles of furniture of above described type 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 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,

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

Fig. 3 is a side elevational view of a different embodiment of an adjustable reclining chair according to the invention,

Fig. 4 is a side elevational view of another embodiment of an adjustable reclining chair according to the invention,

Fig. 5 is a side elevational view of a further modification of an adjustable reclining chair according to the invention,

Fig. 6 is a side elevational view of a different embodiment of an adjustable reclining chair, according to the invention, and

Fig. 7 is a side elevational view of another embodiment of an adjustable reclining chair according to the invention.

Referring now to Fig. 1, 10 generally indicates a support composed of side frames connected with each other by cross-bars 12.

The lower end portion of a back-rest 14 is pivoted to the support 10 at 16. The rear portion of a seat 18 is pivoted to the support 10 at 20 at

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a point spaced from the pivotal connection 16 between the back-rest 14 and the support 10. The adjustable reclining chair comprises at each of its sides a link-chain including a front connecting link 22, an intermediate connecting link 24 and a top connecting link 26; said connecting links are pivotally connected with each other at 28 and 30 respectively. The front end of the link-chain, i. e. the lower end portion of the front connecting link 22 is pivoted to the seat 18 at 32, the rear end of the link-chain, i. e. the rear end portion of the top connecting link 26 is pivoted to an intermediate point of the back-rest 14 above the plane of the seat 18 at 34. Said seat 18, said link-chain 22, 24, 26 and said back-rest 14 form the movable members of a link-system swingably mounted on the support 10 as described above. The movements of the movable members of said link-system are controlled by guiding means or a guiding link 36 associated with the support 10 and a link of the link-chain; according to Fig. 1, one end of the guiding link 36 is pivoted to the support 10 at 38, the other end of said guiding link 36 is rigidly connected with the intermediate connecting link 24.

A leg-rest 40 swingably mounted on the front portion of the seat 18 at 42 has an upward extension 44 on each side of the chair. Said upward extension 44 integral with the leg-rest 40 projects beyond the pivotal connection 42 between the leg-rest 40 and the seat 18. Furthermore, each top connecting link 26 has a forward extension 46 projecting beyond the pivotal connection 30 of the top connecting link 26 with the intermediate connecting link 24. Said forward extension 46 of the top connecting link 26 is integral with the latter. On each side of the chair, one end of a controlling link 48 is pivoted to said forward extension 46 of the top connecting link at 50, the other end of said controlling link 48 is pivoted to the upward extension 44 of the leg-rest at 52. Thus, the movements of the swingable leg-rest 40 are controlled by the controlling link 48 in dependence on the movements of the top connecting link 26 of the link-chain 22, 24, 26.

The sitting position of the movable members of the chair is limited by a stop 54 mounted on the support 10 for cooperation with the seat 18. When the occupant of the chair leans the weight of his body against the back-rest 14 and swings same into a reclined position, for example the extreme reclined position 14' limited by a stop 56 mounted on the support 10 for cooperation with the back-rest, the seat 18 is swung into the reclined position 18' through the medium of

above described link-system, and the leg-rest 40 is brought into the almost horizontal position 40' through the medium of the controlling link 48 arranged between the leg-rest 40 and the top connecting link 26.

According to Figs. 1 and 2, the adjustable reclining chair is provided with a locking device generally indicated by 58, by means of which the movable members of the chair may be held in any desired position. Said locking device 58 comprises a handle 60 screwed on the threaded end of the pivot 34 between the back-rest 14 and the top connecting link 26. Said pivot 34 has a head 62 resting against a surface of the back-rest 14. A square portion 64 of the pivot 34 inserted into a corresponding square aperture of the back-rest 14 prevents the pivot 34 from rotation when the handle 60 is rotated. When the user of the chair loosens said locking handle 60, the surface of the hub 66 of said handle is disengaged from the surface of the top connecting link 26, so that the movable members of the chair may be freely moved from one position into another one. When the locking handle 60 is tightened, the surface of the hub of the handle is pressed against the top connecting link 26, whereby the latter is pressed against the back-rest 14 engaged with the head 62 of the pivot 34, so that the members of the chair are held in their position. Of course, any other locking device may be arranged on the pivot 34 or at any other suitable part of the chair for holding the movable members of the chair in a desired position.

The adjustable reclining chair shown in Fig. 3 comprises a support 110 in the shape of a casing. The back-rest 114 and the seat 118 are coaxially pivoted to the support at 116. The link-chain pivoted to the back-rest 114 at 134 and pivoted to the seat 118 at 132 comprises only two connecting links, i. e. a top connecting link 126 and a front connecting link 122 pivotally connected with each other at 168. The movements of the movable members of the link-system formed by the back-rest 114, the seat 118, the front connecting link 122 and the top connecting link 126 are controlled by a guiding link 136, the lower end of which is pivoted to the support at 138 and the upper end of which is pivoted to the top connecting link 126 at 170.

The movements of a leg-rest 140 swingably mounted on the seat 118 at 142 are controlled by a controlling link 148, one end of which is pivoted to an intermediate point 172 of the top connecting link 126 between the pivotal connections 134 and 168 of the latter with the back-rest 114 and the adjacent front connecting link 122 respectively; the other end of said controlling link 148 is pivoted at 152 to an upward extension 144 of the swingable leg-rest 140.

The sitting position of the movable members of the chair shown in full lines is limited by a stop 154 arranged on the support 110 for cooperation with the seat; the extreme reclined position of the movable members of the chair shown in dash and dot lines is limited by a stop 156 arranged on the support 110 for cooperation with the back-rest 114.

The movable members of the chair may be held in any desired position by a locking device 158 of the type shown in Fig. 2.

The adjustable reclining chair shown in Fig. 4 comprises a support 210 in the shape of a casing. The link-system 214, 218, 222, 226 swingably mounted on the support 210 at 216 and the guiding link 236 pivoted to the support 210 at 238 and pivoted to the top connecting link 226 at 270 correspond entirely to the link-system and the guiding link of the chair shown in Fig. 3.

According to Fig. 4, however, one end of the controlling link 248 is pivoted to an intermediate point 272 of the front connecting link 222 between the pivotal connections 232 and 268 of the latter with the seat 218 and the adjacent top connecting link 226 respectively; the other end of said controlling link 248 is pivoted at 252 to the upward extension 244 of the leg-rest 240 swingably mounted on the seat 218 at 242. Thus, the movements of the swingable leg-rest 240 are controlled by the controlling link 248 in dependence on the movements of the front connecting link 222 of the link-chain 222, 226.

The sitting position of the movable members of the chair shown in full lines is limited by a stop 254 arranged on the support for cooperation with the seat 218; the extreme reclined position of the movable members of the chair is limited by a stop 256 arranged on the support 210 for cooperation with the back-rest 214.

The movable members of the chair may be held in any desired position by means of a locking device 258 of the type shown in Fig. 2.

According to the embodiment of a chair shown in Fig. 5, again the link-system 314, 318, 322, 326 swingably mounted on the support 310 at 316 corresponds to the link-system of the chair shown in Fig. 3; likewise, the movements of said link-system are again controlled by a guiding link 336, one end of which is pivoted to the support 310 at 338, and the other end of which is pivoted to the top connecting link 326 at 370.

According to Fig. 5, however, one end of the controlling link 348 is hinged to the pivotal connection 368 between the front connecting link 322 and the top connecting link 326; the other end of said controlling link 348 is pivoted at 352 to an upward extension 344 of the leg-rest 340 swingably mounted on the seat 318 at 342.

The sitting position of the movable members of the chair is limited by a stop 354 arranged on the support 310 for cooperation with the seat 318; the extreme reclined position of the movable members of the chair is limited by a stop 356 arranged on the support 310 for cooperation with the back-rest 314.

The adjustable reclining chair shown in Fig. 6 comprises a support 410 in the shape of a casing. The lower end portion of a back-rest 414 is pivoted to the support 410 at 416 at a point spaced from the pivotal connection 420 between the seat 418 and the support 410. The link-chain comprises a front connecting link 422 and a top connecting link 426 pivotally connected with each other at 468. The lower end of the front connecting link 422 is pivoted to the seat 418 at 432, the rear end of the top connecting link 426 is pivoted to the back-rest 414 at 434. The movements of the movable members of the link-system 418, 422, 426, 414 are controlled by a guiding link 436 pivoted to the support 410 at 438 and pivoted to the top connecting link 426 at 470.

According to Fig. 6, the front connecting link 422 has an upward extension 474 projecting beyond the pivotal connection 468 of the front connecting link 422 with the adjacent top connecting link 426. The controlling link 448 is pivoted at one of its ends to said upward extension 474 of the front connecting link 422 at 476; the other end of the controlling link 448 is pivoted at 452 to an upward extension 444 of the leg-rest 440 swingably mounted on the seat 418 at 442.

The sitting position of the movable members of the chair is limited by a stop 454 arranged on the support 410 for cooperation with the seat 418; the extreme reclined position of the movable members of the chair is limited by a stop 456 arranged on the support 410 for cooperation with the back-rest 414.

The movable members of the chair may be held in any desired position by means of a locking device 458 of the type shown in Fig. 2.

According to the embodiment of an adjustable reclining chair shown in Fig. 7, the support 510 comprises two side frames connected with each other by cross-bars 512. The back-rest 514 and the seat 518 are coaxially pivoted to the support 510 at 516. The link-chain comprises a front connecting link 522, an intermediate connecting link 524 and a top connecting link 526. Connecting links of the link-chain are pivotally connected with each other at 528 and 530 respectively. The front connecting link 522 is pivoted to the seat 518 at 532, the top connecting link 526 is pivoted to the back-rest 514 at 534. One end of a guiding link 536 is pivoted to the support 510 at 538, the other end of said guiding link 536 is rigidly connected with the intermediate connecting link 524 of the link-chain for controlling the movements of the movable members of the link-system 514, 518, 522, 524, 526.

According to Fig. 7, the front connecting link 522 has a downward extension 578 projecting beyond its pivotal connection 532 with the seat 518. One end of the controlling link 548 is pivoted at 580 to said downward extension 578 of the front connecting link 522; the other end of said controlling link 548 is pivoted at 582 to an intermediate point of the leg-rest 540 swingably mounted on the front portion of the seat 518 at 542.

The sitting position of the movable members of the chair shown in full lines is limited by a stop 554 arranged on the support 510 for cooperation with the seat 518; the extreme reclined position of the movable members of the chair shown in dash and dot lines is limited by the stop 556 arranged on the support 550 for cooperation with the back-rest 514; the movable members of the chair may be held in any desired position by a locking device 558 of the type shown in Fig. 2.

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 and changes in shape, proportion and arrangement of parts, as well as the substitution of equivalent elements for the arrangements shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

For example, the controlling mechanism of the leg-rest by means of a controlling link pivoted to the leg-rest and a connecting link of a link-chain of a reclining article of furniture may be applied also to reclining articles of furniture provided with a link-system of a different type than that shown in the drawings; for example, the movements of the movable members of such a link-system could be controlled by guiding means in the shape of cooperating sliding means.

Furthermore, the invention may be applied to other articles of furniture than the type of chairs shown in the drawings, for example to office chairs, chairs for use in railroad cars, chairs for use in airplanes, loungets, etc.

What I claim is:

1. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links; said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member; means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one end portion of said controlling link being pivoted to one of said connecting links, and the other end portion of said controlling link being pivoted to the structure of said leg-rest.

2. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link means and a plurality of movable links, said stationary link means being included in said support, said movable links including a seat-member, a back-rest member, a guiding link and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat-member; the lower end of said guiding link being pivoted to said support, the upper end of said guiding link being connected with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one end portion of said controlling link being pivoted to one of said connecting links, and the other end portion of said controlling link being pivoted to the structure of said leg-rest.

3. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link means and a plurality of movable links, said stationary link means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one

of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, the structure of said leg-rest including an upward extension projecting beyond the pivotal connection between the leg-rest and the seat-member, and a controlling link, one end portion of said controlling link being pivoted to one of said connecting links, and the other end portion of said controlling link being pivoted to said extension of the leg-rest.

4. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one end portion of said controlling link being pivoted to said top connecting link, and the other end portion of said controlling link being pivoted to the structure of said leg-rest.

5. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, the structure of said leg-rest including an upward extension projecting beyond the pivotal connection between the leg-rest and the seat-member, and a controlling link, one end portion of said controlling link being pivoted to said top connecting link, and the other end portion of said controlling link being pivoted to said extension of the leg-rest.

6. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain,

said top connecting link having an extension projecting beyond its pivotal connection with the adjacent connecting link, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, the structure of said leg-rest including an upward extension projecting beyond the pivotal connection between the leg-rest and the seat-member, and a controlling link, one end portion of said controlling link being pivoted to said extension of the top connecting link, and the other end portion of said controlling link being pivoted to said extension of the leg-rest.

7. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link means being included in said support, said movable links including a seat member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one end portion of said controlling link being pivoted to an intermediate point of said top connecting link, and the other end portion of said controlling link being pivoted to the structure of said leg-rest.

8. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one end portion of said controlling link being pivoted to said front connecting link, and the other end portion of said controlling link being pivoted to the structure of said leg-rest.

9. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one end portion of said controlling link being pivoted to an intermediate point of said front connecting link, and the other end portion of said controlling link being pivoted to the structure of said leg-rest.

10. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, said front connecting link having an extension projecting beyond its pivotal connection with the adjacent connecting link, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one

end portion of said controlling link being pivoted to the extension of said front connecting link, and the other end portion of said controlling link being pivoted to the structure of said leg-rest.

11. An article of repose for supporting the body of a person, comprising in combination: a support, a constrained linkage having stationary link-means and a plurality of movable links, said stationary link-means being included in said support, said movable links including a seat-member, a back-rest member, guiding means and a chain of connecting links including a top connecting link at one end of the chain and a front connecting link at the other end of the chain, said top connecting link and said front connecting link being pivotally connected with each other, at least one of said connecting links being arranged above the plane of the seat-member, said guiding means being connected to said support and being engaged with at least one connecting link of said chain of connecting links, said top connecting link being pivoted to an intermediate point of the back-rest member, said front connecting link being pivoted to the front portion of said seat-member, means pivotally connecting at least one of said back-rest and seat-members with said support, a leg-rest swingably mounted on the front portion of said seat-member, and a controlling link, one end portion of said controlling link being pivotally connected with said front connecting link in coaxial alignment with the pivotal connection between the top connecting link and the front connecting link, and the other end portion of said controlling link being pivoted to the structure of the leg-rest.

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