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(54) **RECLINING LOUNGE CHAIR**

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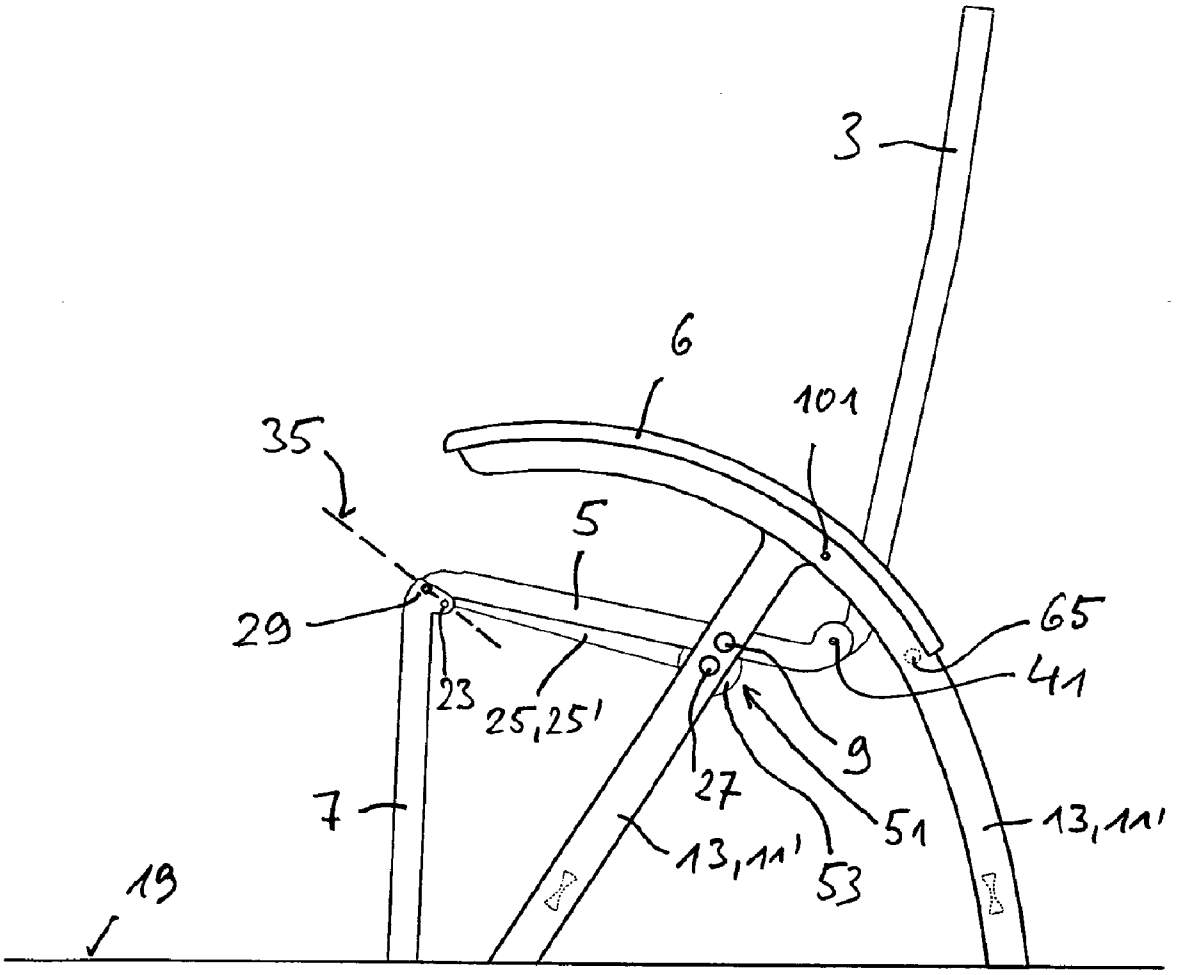
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(57) **ABSTRACT**

An improved reclining lounge chair is described, which comprises a footrest that is pivotally connected to a center seat member by a footrest attachment axle, and in which the footrest position is controlled by a footrest lift mechanism. While the lounge chair is its non-reclined upright position the footrest is oriented approximately vertical. In this approximately vertical orientation the footrest doesn't extend significantly forward of the center seat member, thus allowing an occupant easy access to the chair from the front. In its fully reclined position the footrest rotates into an approximately horizontal orientation, providing a comfortable reclined position.



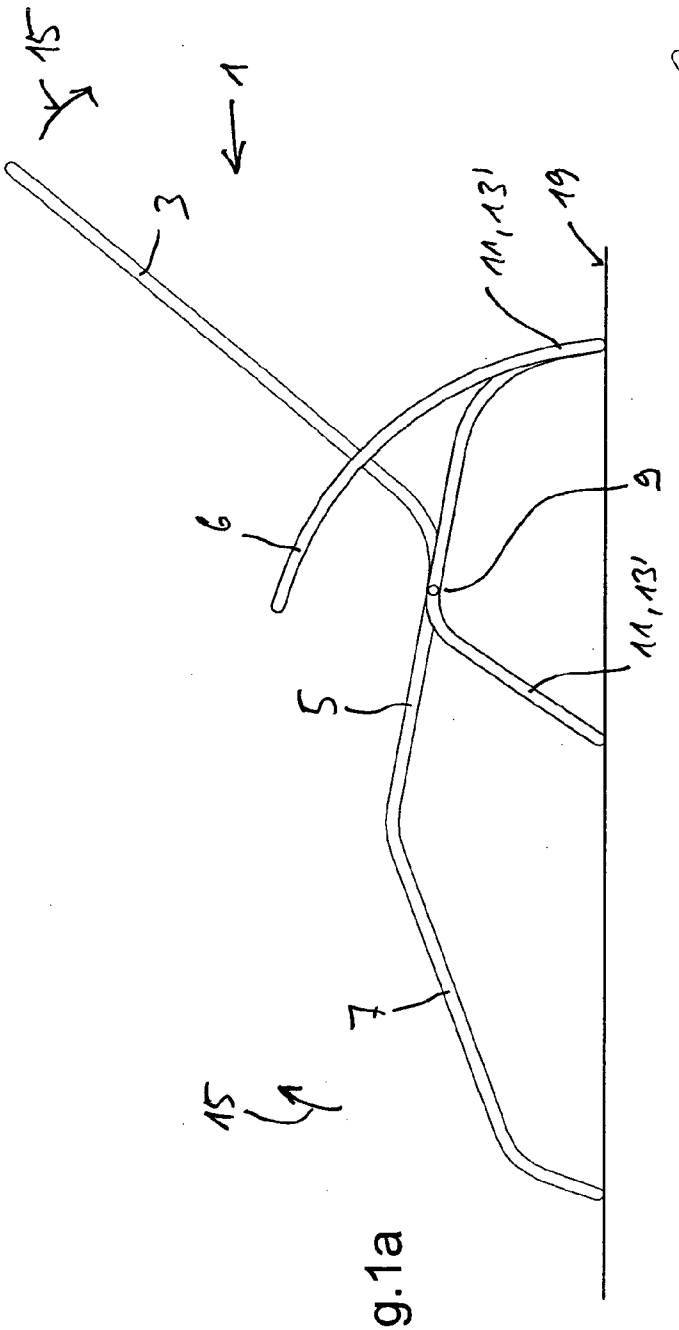


Fig.1a

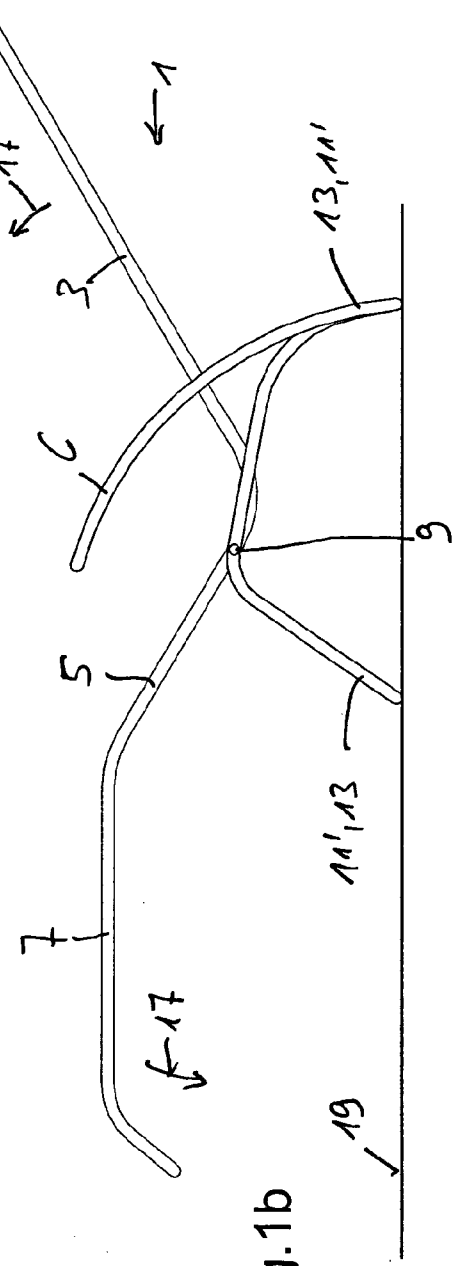


Fig.1b

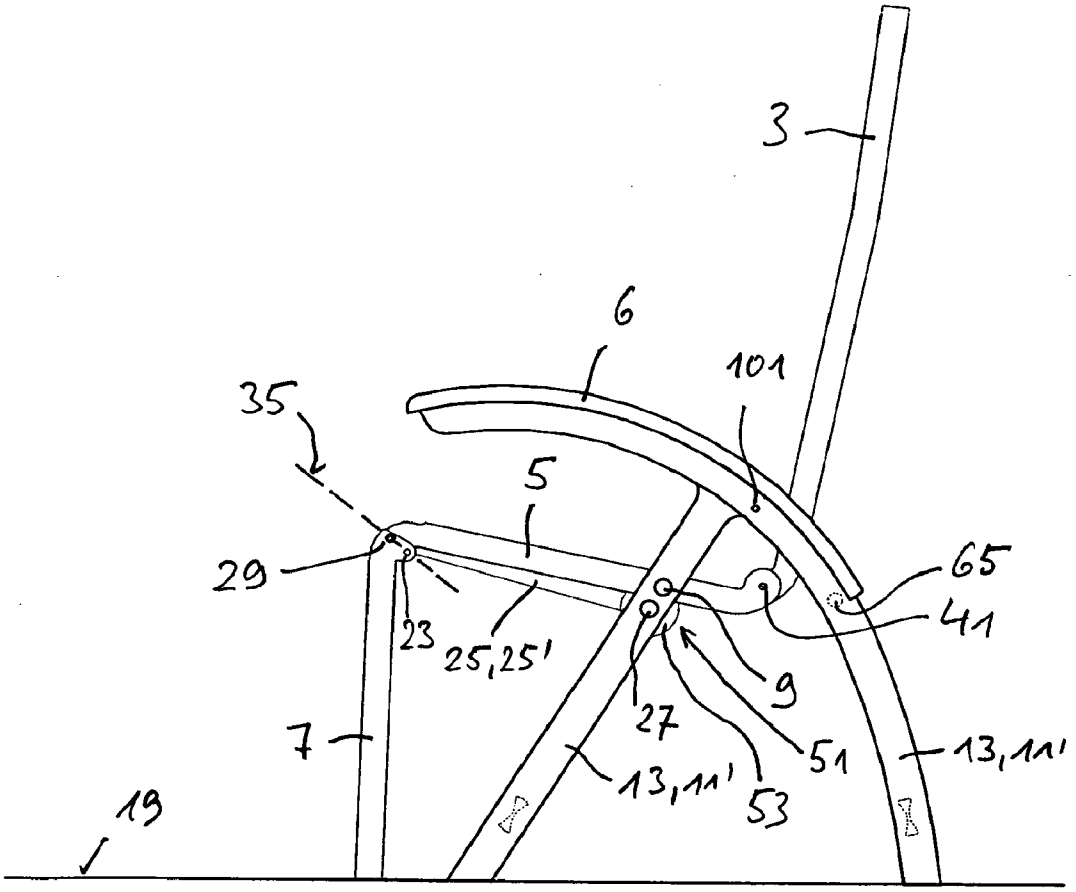

3
6
101
35
5
29
65
41
23
25,25'
9
27
7
51
13,11'
13,11'
53
19

Fig. 2

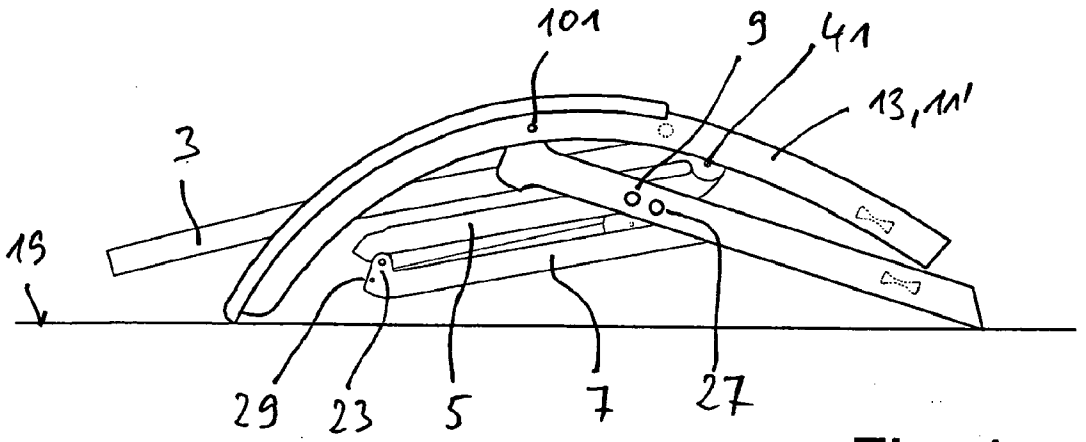

101
9
41
13,11'
3
19
29
23
5
7
27

Fig. 4

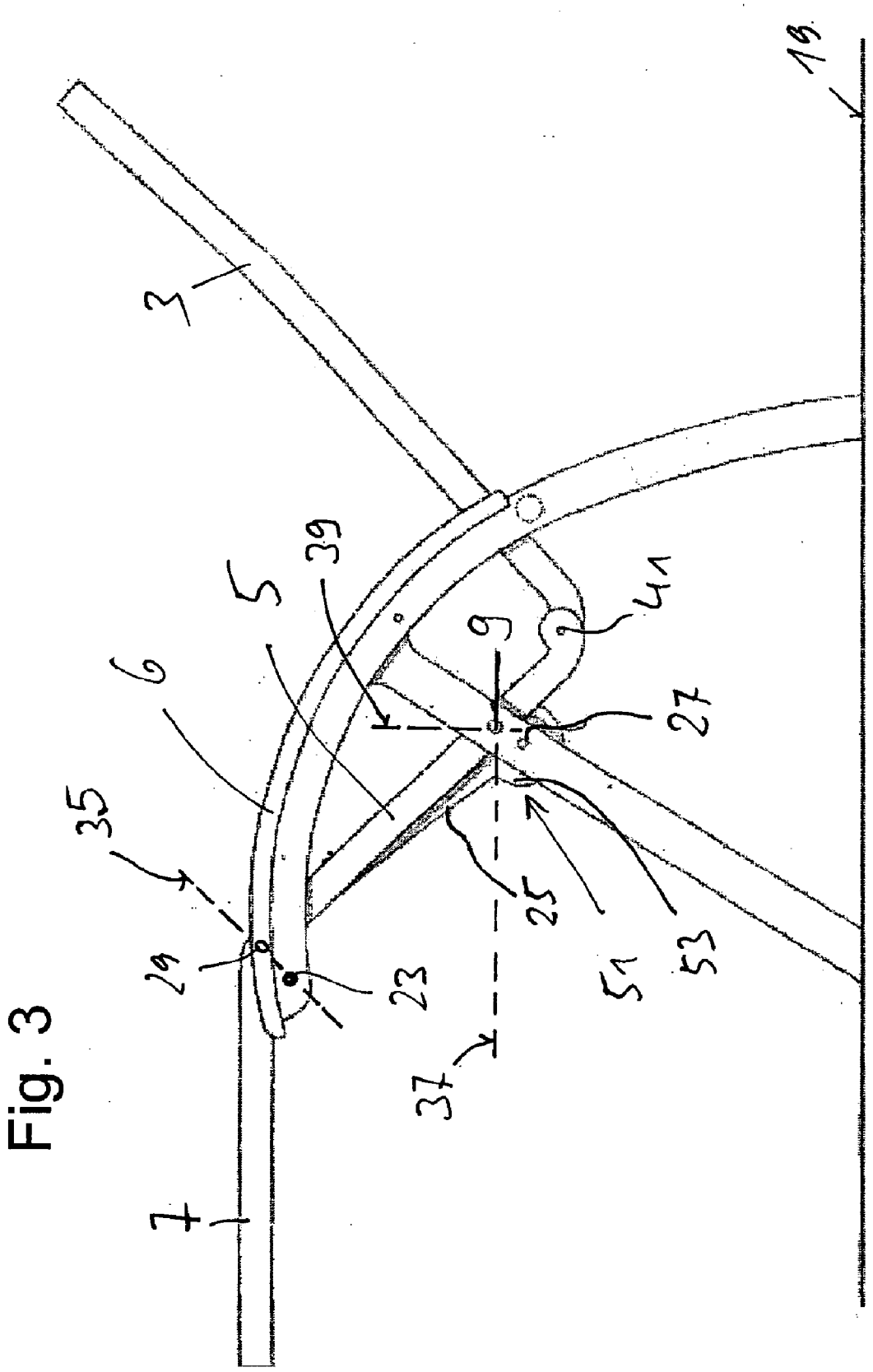


Fig. 3

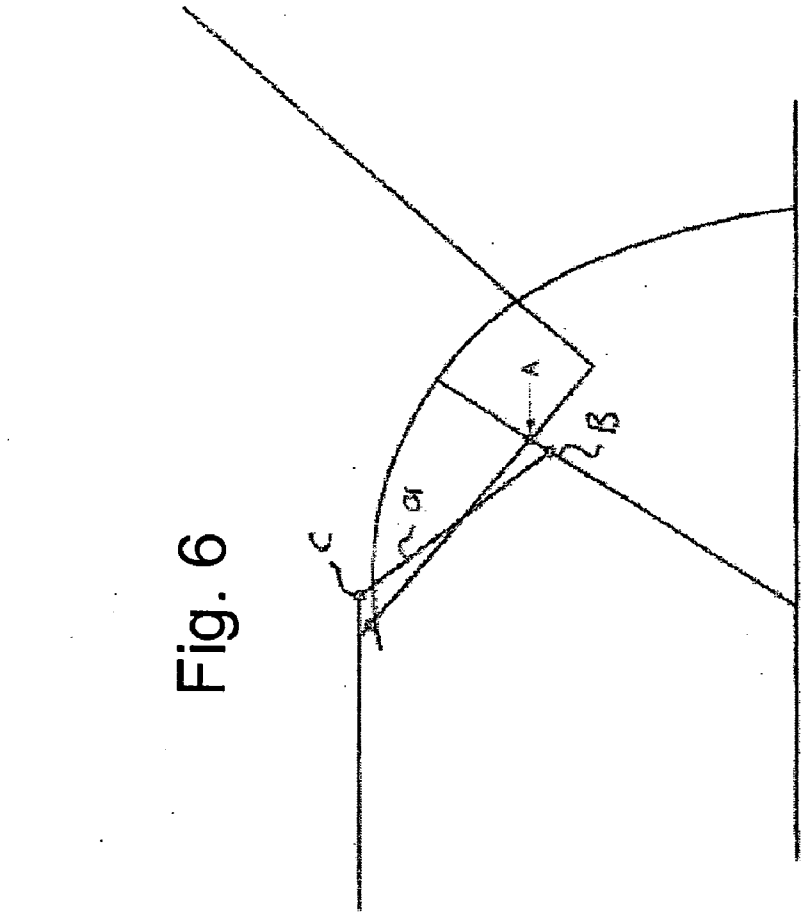


Fig. 6

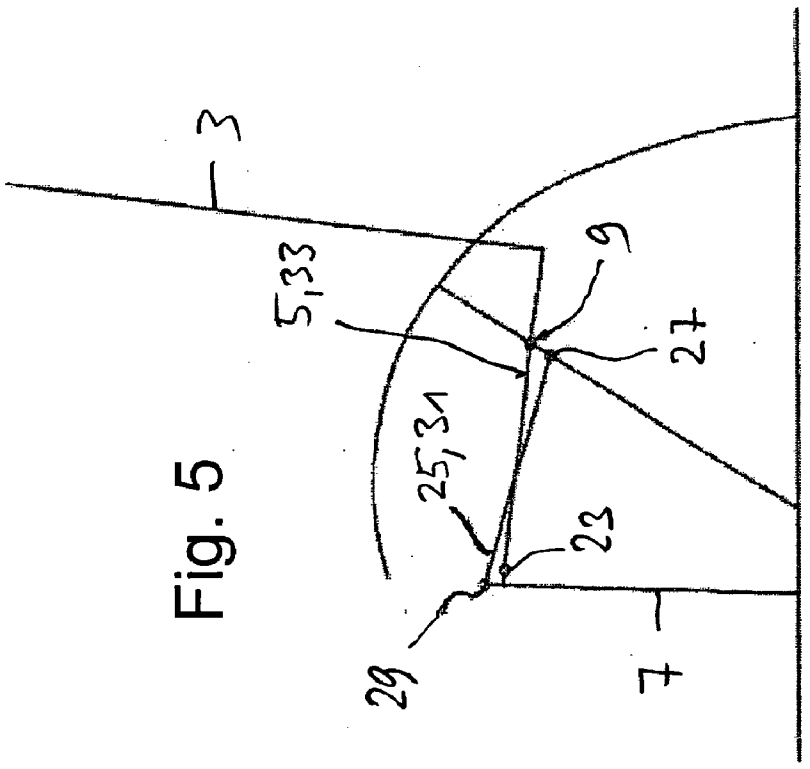


Fig. 5

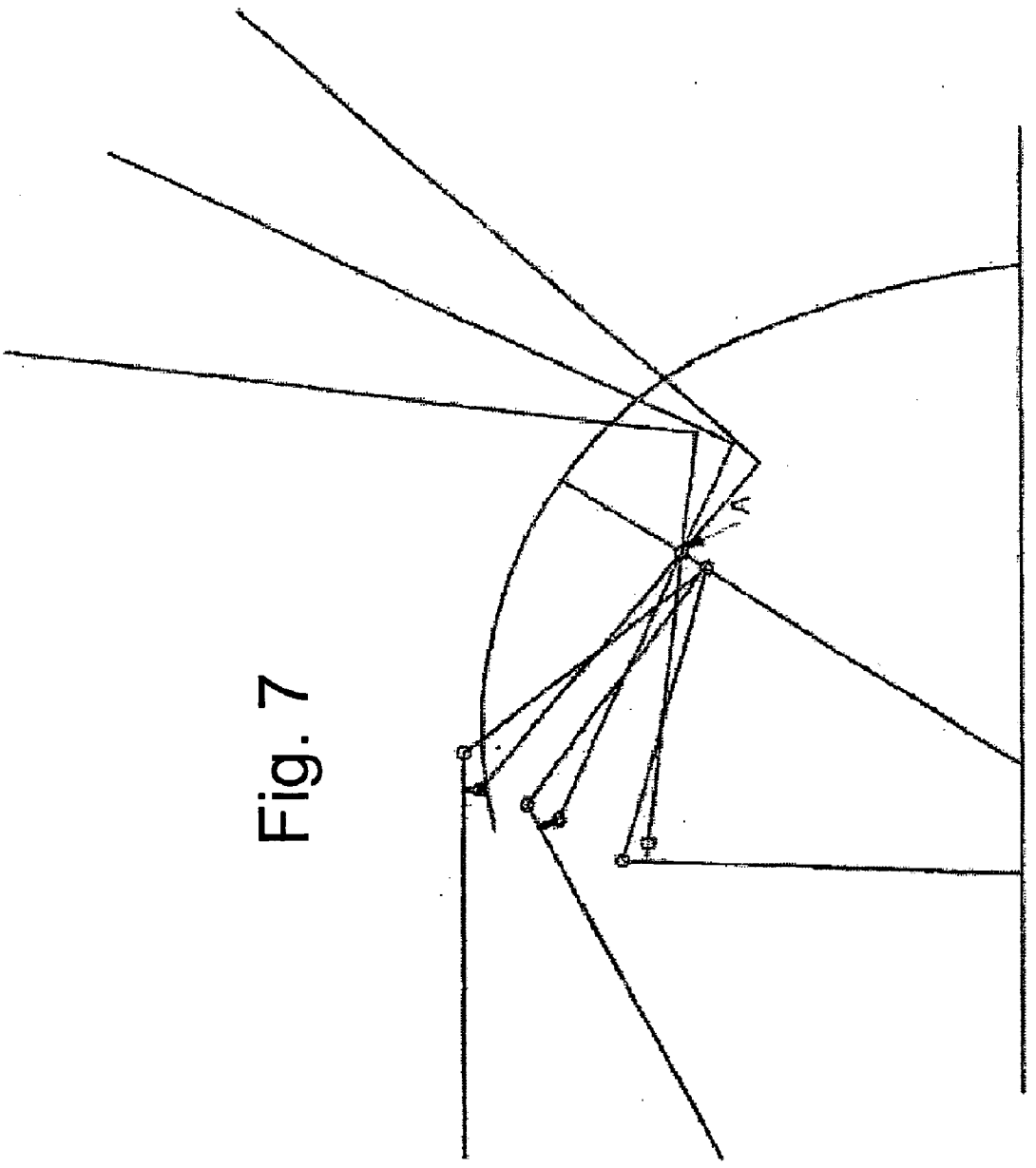
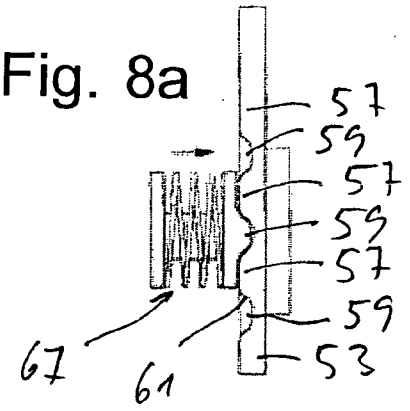


Fig. 7

Fig. 8a



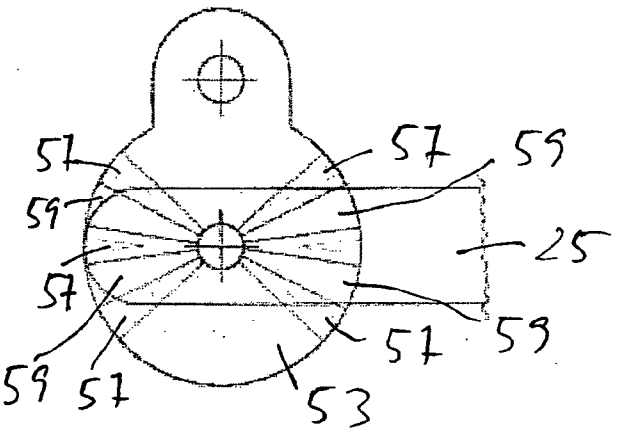
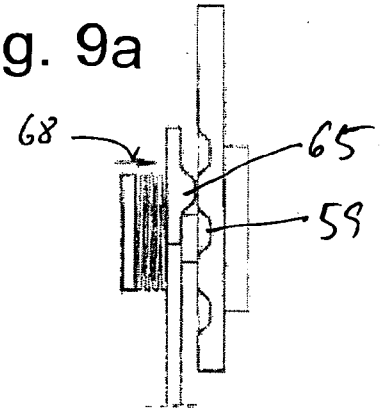


Fig. 8b

Fig. 9a



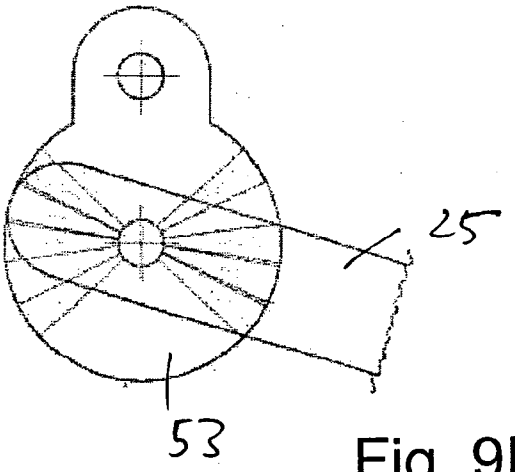
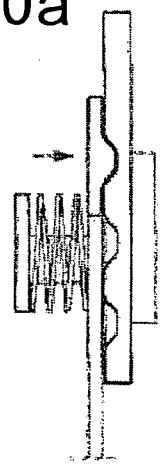


Fig. 9b

Fig. 10a



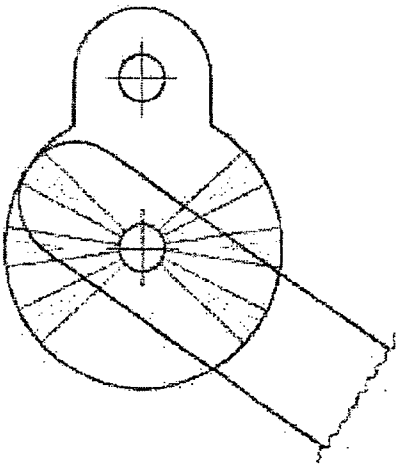


Fig. 10b

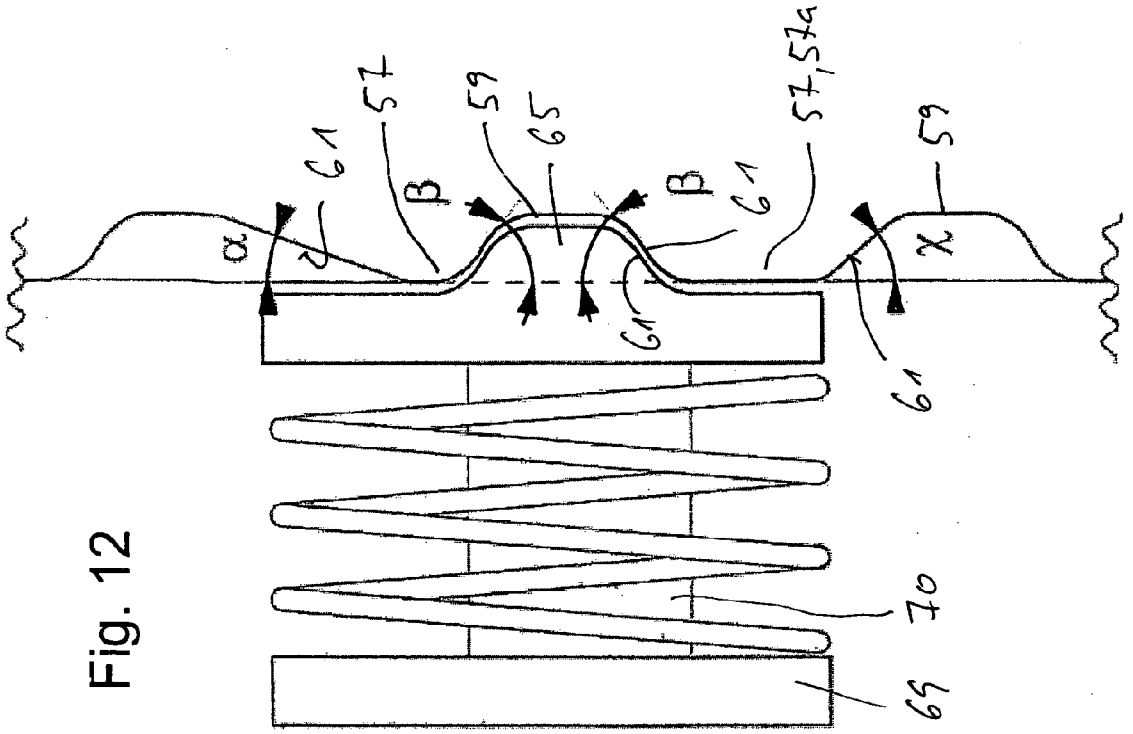


Fig. 12

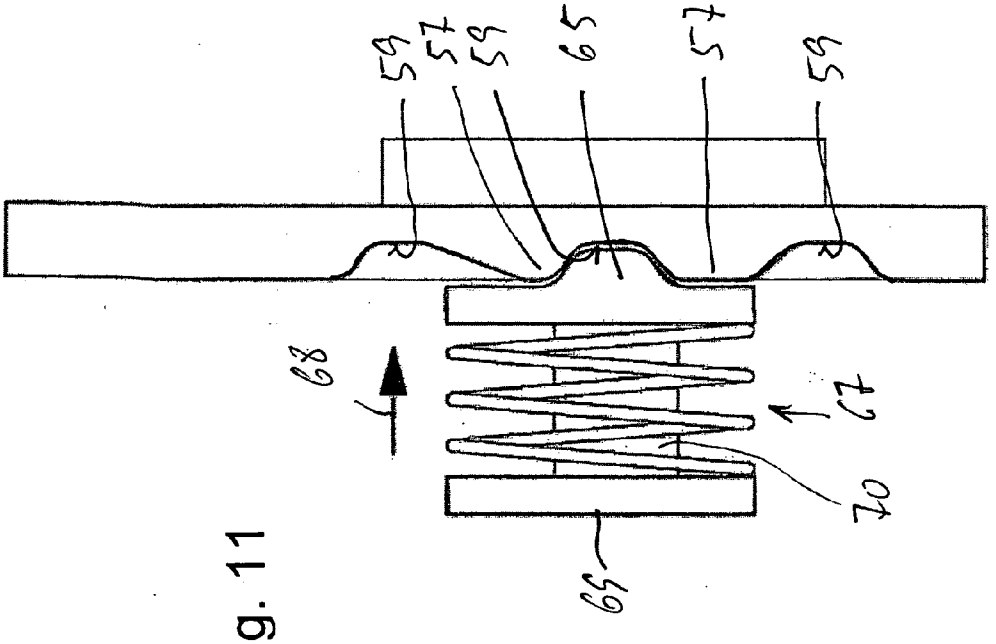


Fig. 11

RECLINING LOUNGE CHAIR

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This is a continuation of international patent application PCT/EP2007/006864, filed Aug. 2, 2007, which designated the United States, and which claimed priority to German patent application No. 10 2006 039 278.7, filed Aug. 22, 2006. These applications are hereby incorporated by reference.

TECHNICAL FIELD

[0002] The present invention generally relates to a reclining lounge chair, and more particularly, to a reclining lounge chair comprising a footrest lift mechanism.

BACKGROUND OF THE INVENTION

[0003] Lounge chairs, which can be adjusted between an upright position and a reclined position, are well known. A category-defining reclining lounge chair is described in FR 635,465 A. This known chair comprises a footrest, which is connected to a seat by a horizontal pivot axis. An adjusting lever mechanism is provided, which is pivotally supported by a horizontal support axle relative to the frame. The opposite end of the adjusting lever mechanism is pivotally supported by the footrest through a horizontal support axle.

[0004] A reclining lounge chair comprising a seat, a backrest, and a footrest, is described in EP 0,358,666 B1, invented by the same inventor hereof. The backrest is pivotally joined to the seat by a horizontal axle, and the seat is pivotally joined to the footrest by a horizontal axle, respectively. Thereby, the seating and lounge chair can be folded, such that the footrest, the seat, and the backrest are located essentially parallel to each other.

[0005] The reclining lounge chair of EP 0,358,666 can be adjusted into a semi-reclined lounge position, in which the backrest points upward and rearward, extending from the rear end of the seat. The footrest points downward and forward from the front end of the seat towards the floor. From this position the lounge chair can be adjusted into a fully reclined sleeping position, in which footrest, seat, and backrest are essentially located in a continuous horizontal plane. This style of reclining lounge chairs has been well accepted in the market.

[0006] In variation therefrom other reclining lounge chairs exist. Reclining lounge chairs are known, which comprise an integral couch frame comprising a center seat section, a backrest section, and footrest section. In such chairs the backrest section is positioned at a fixed predetermined small angle relative to the center seat section, and the center seat section is positioned at a fixed predetermined small angle relative to the footrest section. The integral couch frame can pivot about a single horizontal axis relative to a base frame. Such lounge chairs, known as "health loungers", can often be found in baths, sanatoriums, etc. An occupant can adjust such lounge chairs by shifting his or her weight. The lounge chair can typically be adjusted between an upright position, in which the front end of the integral couch frame touches the floor, and a fully reclined position, in which the footrest is aligned approximately horizontal.

[0007] An advantage of these "health loungers" is their simple design, since the entire couch frame is connected with the base frame by a single horizontal axle, around which the chair can pivot. No further hinges between backrest and seat or between seat and footrest are provided. Disadvantageous, however, is that getting in and out of such couches is cumbersome, especially for elderly persons. In order to sit down an occupant may enter from the front, but that requires walking backward with legs spread far apart to clear the footrest. Alternatively an occupant can attempt to enter or exit the couch from the side, but that is difficult due to armrests blocking access to the couch from the side.

[0008] Based on the previously described "health lounger" it is an object of the current invention to provide an improved reclining lounge chair, that can be adjusted between at least an upright position and a reclined position, and that has ergonomic advantages over known health loungers.

SUMMARY OF THE INVENTION

[0009] In one aspect of the invention, a reclining lounge chair is provided, which comprises a footrest that is pivotally connected to a center seat member by a footrest attachment axle. A footrest lift mechanism is operatively connected to the footrest. The footrest lift mechanism causes the footrest to rotate about the footrest attachment axle as the lounge chair is reclined. While the lounge chair is in its non-reclined, upright position, the footrest is oriented approximately vertical. In this approximately vertical orientation the footrest doesn't extend significantly forward of the center seat member, thus allowing an occupant easy access to the chair from the front. The center seat member may be at a height from the floor that is typical for chairs, which allows an occupant to easily get in and out of the lounge chair while in the upright position. This ergonomic design is a significant improvement over the previously described health lounges, which have fixed footrests that extend forward of the center seat member at all times.

[0010] The reclining lounge chair may comprise a seat and backrest subassembly, which is pivotally connected to a base frame by a seat attachment axle. Also operatively connected to the base frame is the rear end of the footrest lift mechanism. The front end of the footrest lift mechanism is operatively connected to the footrest. An occupant may adjust the lounge chair from the upright position into a reclined position, simply by shifting his or her weight. This causes the seat and backrest subassembly to rotate about the seat attachment axle. Rotation of the seat and backrest subassembly causes the footrest lift mechanism to simultaneously rotate the footrest about the footrest attachment axle relative to the center seat member. When the lounge chair reaches its fully reclined position the footrest may have rotated from its original approximately vertical orientation into an approximately horizontal orientation, thus providing a comfortable sleeping position.

[0011] To exit, the lounge chair may be adjusted back into the upright position. During the adjustment the footrest lift mechanism causes the footrest to rotate from its approximately horizontal orientation back into its approximately vertical orientation, pointing downward from the footrest attachment axle towards the floor. The vertical orientation of the footrest while the chair is in its upright position allows an occupant to easily exit, as the footrest does not obstruct the exit path.

[0012] Generally, recliners are known, which through a weight shift or by adjusting the backrest, allow a footrest to rotate into an elevated position. Such recliners, however, comprise comparatively complex adjustment mechanisms, often including scissor style rods. In contrast, the disclosed

design is relatively simple, and requires only a single footrest lift mechanism. Due to its simple design the described lounge chair may be used outdoors, for examples in backyards or baths, or commercially, e.g. in hospitals, indoor public swimming pools, etc.

[0013] In another aspect of the invention, the footrest lift mechanism may comprise two footrest lift bars, one on each side of the lounge chair. Each footrest lift bar may be pivotally connected at its front end to the footrest by a front footrest lift axle, and at its rear end to the base frame by a rear footrest lift axle. The footrest lift bars may be aligned almost congruent with the center seat member. To achieve this, the rear footrest lift axle may be located close to the seat attachment axle, preferably below and/or in front of the seat attachment axle. Similarly, the front footrest lift axle may be located close to the footrest attachment axle, and preferably in front of the footrest attachment axle. The footrest may comprise an embedded extension shape to provide sufficient attachment space for both the footrest lift axle and the footrest attachment axle.

[0014] In a further aspect of the invention, the front footrest lift axle and the rear footrest lift axle may be located such, that a line drawn from the front to the rear footrest lift axle intersects a line drawn from the footrest attachment axle to the seat attachment axle.

[0015] In yet another aspect of the invention a latch mechanism may be provided to prevent the reclining chair from changing its position too easily, especially to prevent movement of the chair caused by unintended weight shifts of larger occupants. The latch mechanism may lock the chair in one or more predetermined reclining positions.

[0016] The latch mechanism may comprise a sliding arm, which rotate relative to a latch disk, as the chair is reclined. The sliding arm may be spring-loaded, compressing a latch spring upon axial movement away from the latch disk. The sliding arm may comprise one or more protrusions, that engage one or more radially extending recesses in the latch disk as the chair reaches predetermined reclining positions. Vice versa, the sliding arm may comprise recesses that engage protrusions on the latch disk.

[0017] While the chair is in its upright position one or more protrusions at the sliding arm resiliently engage one or more recesses at the latch disk. When the chair is reclined the sliding arm rotates about an axle extending through the center of the latch disk. This forces the one or more protrusions of the sliding arm to leave the corresponding recesses at the latch disk. The sliding arm is pushed axially along its pivot axis in the center of the latch disk away from the latch disk, thereby compressing the latch spring. Upon reaching a second predetermined reclining position the protrusions at the sliding arm resiliently reengage a second set of recesses in the latch disk, causing the chair to assume a stable, predetermined reclining position. An adjustment force larger than the latch force is required to change the chair's position after it has reached one of its predetermined positions.

[0018] The latch disk may comprise a plurality of recesses to define a plurality of predetermined stable reclining positions. Similarly, the sliding arm may comprise a plurality of protrusions to define a plurality of predetermined stable reclining positions. Protrusions and recesses may be substituted for each other, i.e. the recesses may be located at the sliding arm and protrusions may be located at the latch disk.

[0019] The sliding arm and the latch disk of the latch mechanism may comprise a number of identical protrusions and/or recesses to cause the same latch force in each position. They may also comprise differently shaped protrusions and/or recesses to cause different latch forces for different reclining positions. Using different latch forces for different reclining positions can be used to compensate an undesirable effect: Without a latch mechanism the force required to adjust the chair out of its fully reclined position would be higher than the force required to adjust the chair out of an intermediate reclining position. Similarly, the force required to adjust the chair out of its upright position may be higher than the force required to adjust the chair out of an intermediate position. In an intermediate position the chair may be exactly balanced between rotating forward and backward, thus requiring almost no adjustment force. The required adjustment force is ultimately a function of where the occupant's center of gravity is located relative to the seat attachment axle. To require similar or equal adjustment forces in all three positions, the recesses of the latch disk associated with the upright position may have a shallow front exit, causing a relatively low latch force to exit the upright position. In the intermediate position the recesses may have a steeper angle to increase the latch force that must be overcome to adjust the chair out of the intermediate position.

[0020] The following detailed description of the invention is merely exemplary in nature and is not intended to limit the invention or the application and uses of the invention. Furthermore, there is no intention to be bound by any theory presented in the preceding background of the invention or the following detailed description of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The invention is further explained with reference to the following drawings.

[0022] FIG. **1***a* illustrates a known "health lounger" in an upright position.

[0023] FIG. **1***b* illustrates the "health lounger" of FIG. **1***a* in a reclined position.

[0024] FIG. **2** is a side view of an exemplary reclining lounge chair in the upright position.

[0025] FIG. **3** is a side view of the reclining lounge chair as in FIG. **2**, shown in a fully reclined position.

[0026] FIG. **4** is a side view of the reclining lounge chair as in FIGS. **2** and **3**, shown in a folded state.

[0027] FIG. **5** is a schematic view of the reclining lounge chair as in FIG. **2**.

[0028] FIG. **6** is a schematic view of the reclining lounge chair as in FIG. **3**.

[0029] FIG. **7** is a schematic view overlaying the schematic views of FIG. **5**, FIG. **6**, and a third intermediate reclining position.

[0030] FIGS. **8***a* and **8***b* are a side view and a top view of an exemplary latch mechanism showing the mechanism engaged in a first engaged state.

[0031] FIGS. **9***a* and **9***b* are showing the latch mechanism of FIGS. **8***a* and **8***b* in an intermediate position between a first and a second engaged state.

[0032] FIGS. **10***a* and **10***b* are showing the latch mechanism of FIGS. **8***a* and **8***b* after reaching a second engaged state.

[0033] FIG. **11** is a side view showing an alternative embodiment of a latch mechanism.

[0034] FIG. **12** is a larger, more detailed view of FIG. **11**.

DETAILED DESCRIPTION

[0035] FIGS. **1***a* and **1***b* show a traditional couch, that has become known as a so called "health lounger". It comprises an integral seat assembly **1**, consisting of a backrest section **3**, a center seat section **5** and a footrest section **7**. The seat assembly **1** is a rigid unit, typically comprising an outer frame, in which a textile, slightly elastic and/or cushioned support is held.

[0036] The entire seat assembly **1** may pivot about seat attachment axle **9** relative to base frame **11**. Base frame **11** typically comprises a left and a right base frame element **11'** which are laterally spaced apart, and in between which seat assembly **1** is located. Seat assembly **1** is connected to and held by base frame **11** only through seat attachment axle **9**.

[0037] Base frame **11** typically comprises four feet **13**, two on each side of seat assembly **1**. Feet **13** are in contact with the floor **19**, and are spaced appropriately far apart to provide sufficient stability.

[0038] Through a weight shift seat assembly **1** can be rotated as illustrated by arrow **15** in FIG. **1***a* from an upright position illustrated in FIG. **1***a* clockwise into a reclined position illustrated in FIG. **1***b*. Seat assembly **1** thereby rotates about seat attachment axle **9**. In the reclined position footrest **7** assumes an approximately horizontal orientation. Through a weight shift in the opposite direction, as illustrated by arrow **17** in FIG. **1***b*, the chair can rotate back from the reclined position into the upright position, i.e. until the front end of footrest **7** touches the floor **19**.

[0039] To facilitate the weight shift an armrest **6** is provided, which is connected to or forms a part of base frame **11**.

[0040] Getting onto and out off such "health loungers" is difficult, because footrest **7** is always in a forward position in front of center seat **5**. An improved design is proposed, and discussed with reference to FIG. **2***ff*, whereby the same reference numbers have been used when referring to comparable parts.

[0041] Referring now to FIG. **2**, an exemplary embodiment of an improved reclining lounge chair is illustrated. A seat assembly **1** is provided, comprising a backrest **3**, a center seat member **5**, and a footrest **7**. Center seat member **5** and backrest **3** may form a subassembly, and assume a fixed, predetermined orientation to each other. The subassembly of center seat **5** and backrest **3** may be a single, rigid part.

[0042] Seat assembly **1** is pivotally connected to base frame **11**, i.e. both the left and the right base frame members **11'**, by a horizontal seat attachment axle **9**. Seat attachment axle **9** may be a single shaft extending from the left frame member **11'** to the right frame member **11'**. Seat attachment axle **9** may also consist of two independent attachment members, one each attached to left and right frame member **11'**. Seat attachment axle **9** may be any connection known in the art to pivotally attach center seat member **5** to base frame **11**.

[0043] Footrest **7** is connected to center seat member **5** by a horizontal footrest attachment axle **23**, which footrest **7** may pivot about. Footrest attachment axle **23** may be a single shaft extending across the width of the footrest. Footrest attachment axle **23** may also comprise two independent attachment members, one on each side of footrest **7**. Rotation of footrest **7** about footrest attachment axle **23** is controlled by footrest lift mechanism **25**. Footrest lift mechanism **25** typically consists of a pair of footrest lift bars **25'**, one on each side of the chair. The front end of each footrest lift bar **25'** is pivotally connected to footrest **7** with a front footrest lift axle **29**. The rear end of each footrest lift bar **25'** is pivotally connected to the base frame **11** by a rear footrest lift axle **27**.

[0044] Referring now to FIGS. **5** and **6**, a footrest lift function line **31** is shown, which is a straight line extending from the front footrest lift axle **29** to the rear footrest lift axle **27**. Also shown is a seat member function line **33**, which is a straight line extending from footrest attachment axle **23** to seat attachment axle **9**. As illustrated, the footrest lift axles **29** and **27** are positioned such that the footrest lift function line **31** and the seat member function line **33** intersect.

[0045] Referring back to FIG. **3**, a rotation line or -plane **35** is illustrated, which intersects both footrest attachment axle **23** and front footrest lift axle **29**. Footrest **7** can pivot around footrest attachment axle **23** relative to seat member **5**. Footrest lift axle **29** pivotally connects footrest lift mechanism **25** to footrest **7**.

[0046] Due to the disclosed geometry, an occupant's weight shift onto backrest **3**, as illustrated by arrow **15** in FIG. **2**, causes the subassembly of center seat member **5** and backrest **3** to rotate clockwise. The relative position between center seat member **5** and backrest **3** remains unchanged, since both are in a fixed relative alignment, and may form a single part. An occupant may hold onto armrest **6** to facilitate the weight shift. Armrest **6** may be connected to or form part base frame **11**.

[0047] Clockwise rotation of seat assembly **1** around seat attachment axle **9** causes footrest lift mechanism **25** to pivot about rear footrest lift axle **27**. Seat attachment axle **9** and rear footrest lift axle **27** are operatively connected to base frame **11** at different, fixed locations. Thus, center seat **5** and lift mechanism **25** have different pivot axes: Center seat **5** pivots about seat attachment axle **9**, while footrest lift mechanism **25** pivots about rear footrest lift axle **27**. This causes footrest attachment axle **23** to move relative to front footrest lift axle **29**, as the chair is reclined. As illustrated in FIG. **2** in the chair's upright position front footrest lift axle **29** is in front of (i.e. appearing left of in the drawing) footrest attachment axle **23**. In the chair's fully reclined position illustrated in FIG. **3**, however, front footrest lift axle **29** is behind (i.e. appearing right of in the drawing) footrest attachment axle **23**.

[0048] Rotation line **35**, which indicates the relative position of footrest attachment axle **23** to front footrest lift axle **29**, rotates at least 60°, preferably at least 80°, and especially 90°, when the lounge chair is adjusted from its upright position to its fully reclined position. The illustrated rotation of line **35** causes footrest **7** to rotate correspondingly. In the chair's upright position, as shown in FIG. **2**, footrest **7** assumes an approximately vertical orientation towards the floor **19**. In the reclined position, as shown in FIG. **3**, footrest **7** assumes an approximately horizontal orientation. In the illustrated embodiment footrest **7** rotates about 90° between the chair's upright position and the chair's fully reclined position. This provides a comfortable reclined position, while also allowing an occupant to easily enter and exit the chair in the upright position.

[0049] One aspect of achieving the desired kinematics is illustrated in FIG. **3**. As shown, rear footrest lift axle **27** is located below seat attachment axle **9**, i.e. below horizontal line **37**, which intersects seat attachment axle **9**. Alternatively, or in addition thereto, footrest lift axle **27** may be located in front of seat attachment axle **9**, i.e. on the left side of vertical line **27**, which intersects seat attachment axle **9**. Front footrest lift axle **29** may also be located above horizontal line **37**.

[0050] Footrest lift mechanism **25** has an effective length that is determined by the distance between front footrest lift axle **29** and rear footrest lift axle **27**. Correspondingly, center seat member **5** has an effective length that is determined by the distance between footrest attachment axle **23** and seat attachment axle **9**. The effective length of footrest lift mechanism **25** may be 5%, and preferably more than 10%, shorter than the effective length of the center seat member **5**.

[0051] Finally, favorable kinematics can also be achieved, if the distance between the seat attachment axle **9** and the rear footrest lift axle **29** is short relative to the height of seat attachment axle **9** over floor **19**. The distance between seat attachment axle **9** and rear footrest lift axle **29** is preferably less than 25%, specifically less than 15%, less than 10%, less than 8% or even less than 6% of the height of seat attachment axle **9** over floor **19**. On the other hand, the distance between seat attachment axle **9** and rear footrest lift axle **29** should not be selected too short. Favorably the distance between seat attachment axle **9** and rear footrest lift axle **29** may be more than 2%, more than 4%, 6%, 8% or 10% of the height of seat attachment axle **9** over floor **19**. The same preferred distance ranges apply to the distance between front footrest lift axle **29** and footrest attachment axle **23**.

[0052] The disclosed embodiment is esthetically pleasing, as both footrest lift bars **25'** of footrest lift mechanism **25** may be "hidden" behind an outer frame of center seat element **5**. This can be achieved by disposing footrest lift bars **25'** immediately on the inside of the outer frame of center seat member **5**.

[0053] FIG. **7** schematically illustrates the reclining mechanism, by superimposing a schematic view of the seat assembly **1** in the upright position, an intermediate reclined position, and the fully reclined position. The upright position is schematically also illustrated in FIG. **5**, the fully reclined position schematically illustrated in FIG. **6**.

[0054] Referring back to FIG. **2**, a horizontal stop bar **65** is shown, which extends between the left and the right base frame members **11'** of base frame **11**. Horizontal stop bar **65** provides a stop for backrest **3**, thus limiting the movement of backrest **3**, and defining the maximum reclined position. Stop bar **65** is located at the base frame **11** such, that in the thereby defined fully reclined position footrest **7** is oriented approximately horizontal.

[0055] In an alternative embodiment, backrest **3** may pivot relative to center seat member **5** by utilizing a separate mechanism, which is hinted in FIGS. **2** and **3** by showing a backrest attachment axle **41**. In this embodiment a backrest locking mechanism must also be provided. It is possible to provide a backward stop element, which limits the maximum opening angle of backrest **3** against center seat member **5**, but allows backrest **3** to tilt forward against center seat member **5** to accommodate a favorable storage position.

[0056] Referring to FIG. **4** it is shown, that the lounge chair may assume a storage position, e.g. to minimize the space required to store the lounge chair in extended periods without use, e.g. fall and winter. To achieve this, backrest **3** may rotate around backrest attachment axle **41** forward and towards center seat member **5**. The chair can be folded further by removing rear footrest lift axle **27** from base frame **11**. For this purpose rear footrest lift axle **27** may be attached to base frame **11** with screws, which can be removed with the help of a tool, e.g. a wrench or screwdriver, so that rear footrest lift axle **27** can be disconnected from base frame **11**. This allows further folding of the chair, until footrest **7** is parallel to seat member **5**. Base frame **11** may be designed such, that its front feet **13** can pivot around a front foot attachment axle **101**, which is located close to armrest **6** at each base frame member **11'**. This allows front feet **13** to swivel backward, further reducing the chair's storage size. In its storage position the chair may be reduced to a height of about 30 cm and a length of about 120 cm.

[0057] Even though the lounge chair can be operated as described, it may be further improved by providing a latch mechanism **51**. This is to prevent the chair from accidentally reclining, e.g. by an unintentional weight shift of a larger occupant. Latch mechanism **51** may be located between any two parts of the chair that rotate relative to each other while reclining. A suitable location for locating latch mechanism **51** is around seat attachment axle **9**, where center seat member **5** rotates relative to base frame **11**. Another suitable location is around rear footrest lift axle **27**, where footrest lift mechanism **25** rotates relative to base frame **11**.

[0058] Latch mechanism **51** may be a friction mechanism, which increases the amount of torque required to rotate two parts against each other, e.g. footrest lift mechanism **25** against base frame **11**. Latch mechanism **51** may also be a step mechanism, providing incremental torque when exiting predetermined recline positions.

[0059] An exemplary latch mechanism **51** is disclosed with reference to FIG. **8***a* through **12**. The disclosed latch mechanism comprises a latch disk **53**, which may have the shape of a complete disk, or a partial disk. Latch disk **53** may be mounted torsionally rigid to the inside of base frame **11**, e.g. around rear footrest lift axle **27**. Footrest lift axle **27** will then pass through a hole located in the center of latch disk **53**. Latch disk **53** comprises radially aligned and circumferentially spaced recesses **59** and protrusions **57**. Protrusions **57** may be bars, noses, ribs, or any suitable convex feature. Recesses **59** may be notches, slots, grooves, indentations or any other suitable concave feature. Recesses **59** transition into protrusions **57** in form of slanted slopes **61**.

[0060] Footrest lift bar **25'** of footrest lift mechanism **25** may comprise at least one protrusion **65** that is suitable to engage recesses **59** of latch disk **53**. Alternatively, footrest lift bar **25'** may comprise at least one recess that is suitable to engage protrusions **57** of latch disk **53**. Footrest lift bar **25'** may extend beyond footrest lift bar axle **27**, and comprise two protrusions **65**, one on each side of footrest lift bar axle **27**, and each engaging latch disk **53** at opposite ends.

[0061] Referring to FIG. **11**, footrest lift bar **25'** may move axially along footrest lift axle **27**. Footrest lift bar **25'**, which forms a sliding arm relative to latch disk **53**, may be pushed towards latch disk **53** by a force acting in direction of arrow **68**. This force may stem from pretensioned latch spring **67**. Latch spring **67** may be supported by rearward support plate **69**. Rearward support plate **69** may be held by a bushing **70** that surrounds footrest lift bar axle **27** (not shown).

[0062] To recline the lounge chair, an occupant may shift his or her weight, causing the entire seat assembly **1** to rotate about seat attachment axle **9**. As previously described, this causes footrest lift bar **25'** to rotate about rear footrest lift bar axle **27**. During this rotation protrusion **65** of footrest lift bar **25'** has to exit the corresponding recess **59** of latch disk **53**. Latch disk **53** is connected torsionally rigid to base frame **11**. Protrusion **65** exits recess **59** along tilted slope **61**. FIG. **8***a* illustrates protrusion **65** resiliently engaging recess **59**. FIG. **9***a* shows an intermediate position, in which footrest lift bar **25'** has rotated against latch disk **53**, and protrusion **65** has

exited recess **59**. Lift bar protrusion **65** is now in contact with an opposite protrusion **57** on latch disk **53**. The transition from a protrusion-recess alignment to a protrusion-protrusion alignment forces footrest lift bar **25'** to move axially along rear footrest lift bar axle **27** opposite the pretension of latch spring **67** and opposite the arrow **68** shown in FIG. **9***a*. During further rotation, as shown in FIG. **10***a*, lift bar protrusion **65**, supported by latch spring **67**, engages the next latch disk recess **59**, thereby causing the chair to assume a relatively stable, resilient, latched position.

[0063] The amount of incremental torque provided by latch mechanism **51** when rotating footrest lift bar **25'** against base frame **11** depends on several factors, among them the force of spring **67**, the size and height of protrusion **65**, the height of protrusions **57** and recesses **59**, and the angle of slope **61**. Referring to FIGS. **8***a* through **10***a* it is illustrated, that all protrusions and recesses, as well as their height and their slopes **61** may be dimensioned equal. However, the inherent torque required to rotate footrest lift bar **25'** against base frame **11** (i.e. without latch mechanism **51**) may vary for different chair positions. To equalize the adjustment force required to recline the chair from each locked position to the next if may therefore be desirable to create an inverted torque profile for latch mechanism **51**. Latch mechanism **51** can be designed such, that the latch torque is small for reclining positions that naturally require high adjustment forces, and vice versa latch torque is high for reclining positions that naturally require low adjustment forces.

[0064] As illustrated in FIGS. **11** and **12**, the slope angles α, β, or χ relating to the slopes **61** may be selected differently, as may width **57***a* of the protrusions **57**, so that different "exit angles" cause different incremental torque when entering or leaving various seating or reclined positions. Exiting a particular latched position may require different amount of torque, depending on which position is to be exited.

[0065] Finally, other latching or adjustment mechanisms are possible, e.g. in the kind of a locking brake, e.g. to secure the chair in an intermediate position, such that unintentional adjustment is no longer possible.

[0066] While the present invention has been described with reference to exemplary embodiments, it will be readily apparent to those skilled in the art that the invention is not limited to the disclosed or illustrated embodiments but, on the contrary, is intended to cover numerous other modifications, substitutions, variations and broad equivalent arrangements that are included within the spirit and scope of the following claims.

What is claimed is:

1. A reclining lounge chair, comprising:

a center seat member;

a backrest, the backrest being operatively connected to the center seat member;

a footrest, the footrest being pivotally connected to the center seat member by a footrest attachment axle;

wherein the center seat member, the backrest, and the footrest form a seat assembly, which is pivotally connected to a base frame by a seat attachment axle at the center seat member, and

wherein the seat assembly may rotate about the seat attachment axle between an upright position and a fully reclined position without changing the relative alignment of backrest and center seat section;

a footrest lift mechanism, the front end of the footrest lift mechanism being pivotally connected to the footrest by a front footrest lift axle, and the rear end of the footrest lift mechanism being pivotally connected to the base frame by a rear footrest lift axle;

wherein the rear footrest lift axle is located below the seat attachment axle, and

wherein the footrest lift mechanism causes the footrest to rotate about the footrest attachment axle by more than 60° but less than 125° when the seat assembly is rotated from the upright position to the fully reclined position.

2. The reclining chair as in claim **1**, wherein the footrest rotates by more than 80° about the footrest attachment axle when the seat assembly is rotated from the upright position to the fully reclined position.

3. The reclining chair as in claim **1**, wherein the footrest rotates by less than 100° about the footrest attachment axle when the seat assembly is rotated from the upright position to the fully reclined position.

4. The reclining chair as in claim **1**, wherein the rear footrest lift axle is located forward of the seat attachment axle.

5. The reclining chair as in claim **1**, wherein the rear footrest lift axle is located below the seat attachment axle.

6. The reclining chair as in claim **1**, wherein during regular use the backrest is at a predetermined, fixed angle relative to the center seat member, and wherein the backrest can be folded onto the center seat member to assume a storage position.

7. The reclining chair as in claim **1**, wherein the rear footrest lift axle is located above the seat attachment axle.

8. The reclining chair as in claim **1**, wherein the front footrest lift axle is forward of the footrest attachment axle while the chair is in its upright position.

9. The reclining chair as in claim **1**, wherein the front footrest lift axle is rearward of the footrest attachment axle while the chair is in its fully reclined position.

10. The reclining chair as in claim **1**, wherein the distance between the seat attachment axle and the rear footrest lift axle is less than 15% of the height of the seat attachment axle from the floor.

11. The reclining chair as in claim **1**, wherein the distance between the footrest attachment axle and the front footrest lift axle is less than 15% of the height of the seat attachment axle from the floor.

12. The reclining chair as in claim **1**, wherein the front footrest lift axle is at a height between the footrest attachment axle and the floor.

13. The reclining chair as in claim **1**, wherein

the base frame comprises two base frame members, one of which is located left of the seat assembly and one of which is located right of the seat assembly, and wherein

the footrest lift mechanism comprises two footrest lift bars, which are located inside of and adjacent to each of the two base frame members.

14. The reclining chair as in claim **1**, further comprising a latch mechanism, which latches the chair in one of two or more predetermined reclining positions.

15. The reclining chair as in claim **14**, wherein the latch mechanism is located between two parts of the chair that rotate relative to each other while reclining.

16. The reclining chair as in claim **14**, wherein the latch mechanism is located on the inside of the base frame around the rear footrest lift axle.

17. The reclining chair as in claim **14**, wherein the latch mechanism comprises

a latch disk with alternating radially aligned protrusions and recesses that is attached torsionally rigid to the base frame, and

a sliding element which rotates about the disk's center axis,

wherein the sliding element comprises at least one protrusion, which is pushed into the latch disk by a latch spring.

18. The reclining chair as in claim **17**, comprising two or more identical protrusions and recesses.

19. The reclining chair as in claim **17**, comprising two or more protrusions and recesses which are different in at least one of size, width, and slope angle.

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