

[54] **PIVOTING CHAIR WITH PIVOTALLY DISPLACEABLE SEAT AND BACK**

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678,376 7/1901 Carlson..... 297/430

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[52] U.S. Cl..... **272/58, 272/83 R, 297/50, 297/318, 297/342, 297/430**

[51] Int. Cl..... **A63b 23/02**

[58] Field of Search..... 272/58, 71, 72, 57 R, 272/79 R, 82, 83 R; 297/316, 317, 318, 34, 35, 36, 46, 50, 115, 116, 311, 313, 320, 322, 340, 341, 342, 417, 430

[57] **ABSTRACT**

A device in the form of a chair having seat and back sections which pivot on a base in a toggle action. The seat and back sections are pivotally interconnected at their juncture and are pivotally connected to the base member at respective spaced pivot positions. The seat section can shift to slidably displace its pivot position, thereby providing freedom of toggle movement. Further embodiments include an extendable footrest and spring loaded arms.

[56] **References Cited**

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3,252,734 5/1966 Berlin 297/317

7 Claims, 12 Drawing Figures

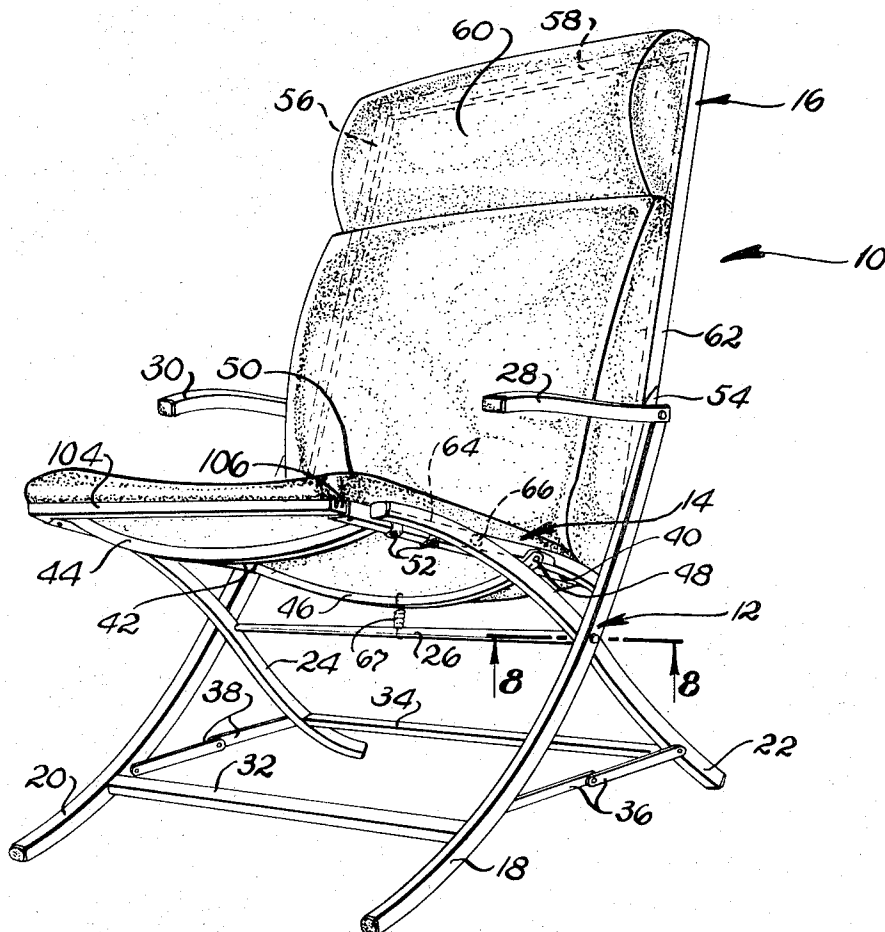


Fig. 1.

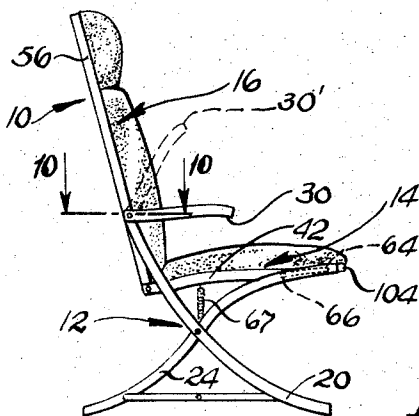
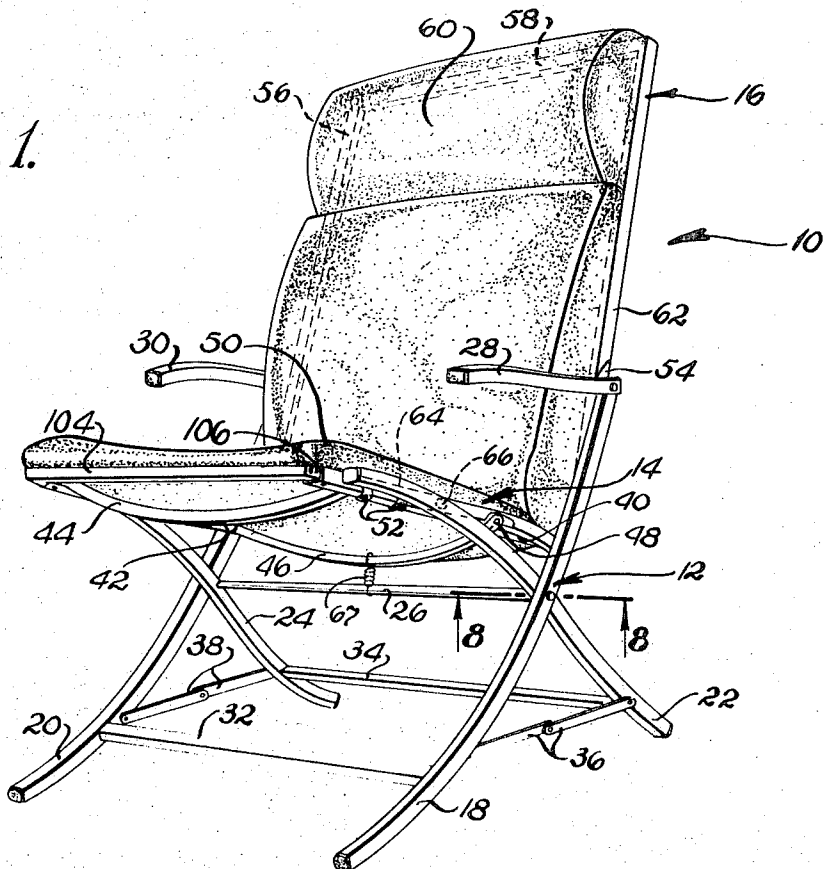


Fig. 2.

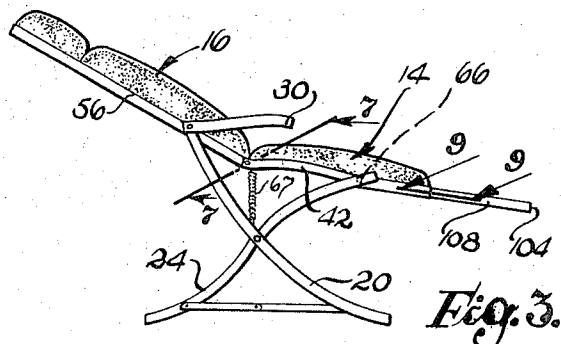


Fig. 3.

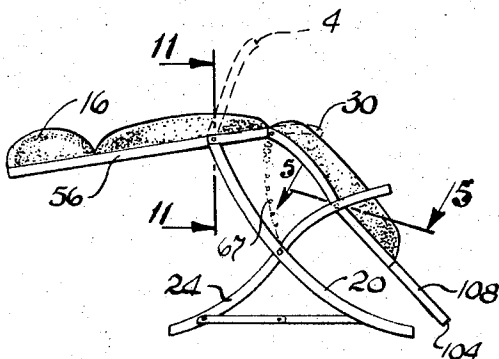


Fig. 4.

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Fig. 12.

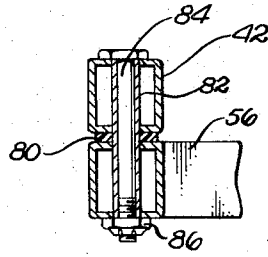
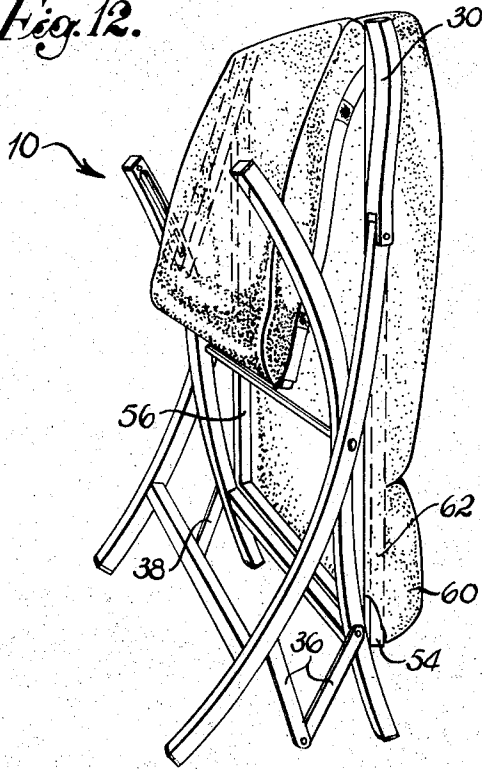


Fig. 7.

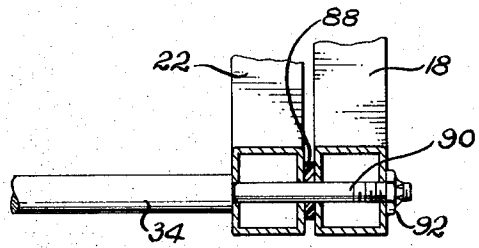


Fig. 8.

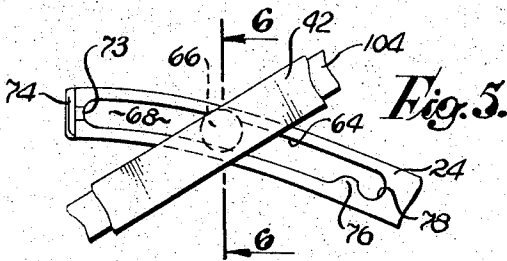


Fig. 5.

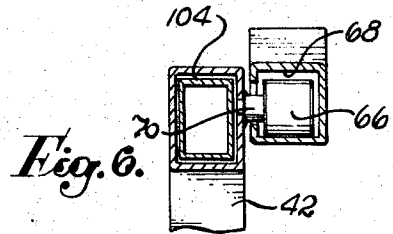


Fig. 6.

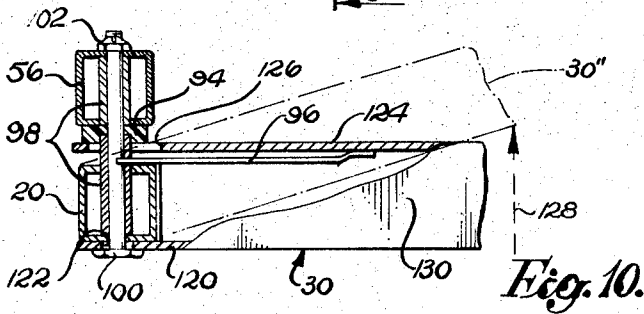


Fig. 10.

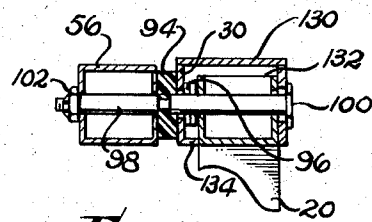


Fig. 11.

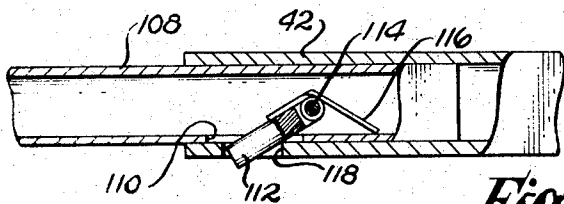


Fig. 9.

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PIVOTING CHAIR WITH PIVOTALLY DISPLACEABLE SEAT AND BACK

FIELD OF THE INVENTION

The field of art to which the invention pertains includes the field of amusement and exercising devices, particularly of the chair and sofa type.

BACKGROUND AND SUMMARY OF THE INVENTION

There are available a wide variety of exercising devices which operate on a toggle principle. Such devices generally take the form of an open frame cot on which the user reclines. See for example Lyon Design U.S. Pat. No. 213,889, Sellner Reissue U.S. Pat. No. 24,762, Lyon U.S. Pat. No. 3,491,998, Solloway et al. U.S. Pat. No. 2,938,572, Sellner U.S. Pat. No. 3,043,591 and Kupchinski U.S. Pat. No. 3,378,259. See also for further background hereto U.S. Pat. Nos. 312,763, 1,641,188, 2,240,204, 2,562,339, 2,808,827, 2,903,046, 3,096,121, 3,189,344, 3,235,304, 3,342,485 and 3,495,869.

The present invention provides an exercising device which is used in a manner similar to that of a toggle cot, but which, in its upright position, takes the form of a chair. This is accomplished by providing a unique pivot point displacement mechanism which allows the seat of the chair to be displaced forwardly as it is being pivoted, thereby enabling the toggle action and allowing the chair to assume a horizontally directed position.

In general terms, an exercising device is provided, comprising a base member, a seat frame and a back frame. The back and seat frames are pivotally interconnected at their junction and the frames are pivotally connected to the base member at respective spaced pivot positions. At least one of the pivot positions is slidably displaceable on the base member so as to provide freedom of swinging movement of the seat and back frames on their pivotal interconnection and on the pivotal connections with the base member. In a specific embodiment, pivotal connection with the base member is accomplished with pivot points intermediate the length of the seat and back frames and the seat frame can shift to slidably displace its pivot position. The base member is formed with vertically rising legs curved along their upper extents to a horizontal direction. The curved upper extents of the legs are channeled and carry rollers which slide therein, the rollers being pivotally connected at opposite points between the length of the seat. As a result of this construction, during use, the seat alternately slides forwardly and rearwardly while pivoting so as to effect the toggle action. The rear ends of the roller channels are formed with detent sections for retaining the seat in an extreme rearward position when the back is upright.

In further embodiments, an extendable footrest is provided in the form of a U-shaped member the legs of which slide within tubular members lengthwise on each side of the seat frame. In still other embodiments, spring loaded arms are provided which can be moved inwardly to provide exercise of the pectoral muscles.

As a result of the unique construction of the present apparatus, and in particular, the unique combination of pivotally interconnecting seat and back frames and slidable pivot connection to a support base, an exercising device is obtained which can also be used as a very comfortable chair. For the first time, paraplegics and

others who are chair-confined, including the large number of people who sit most of the day, can obtain regular and vigorous exercise, without leaving their chair. As a result of the unique chair configuration, stretching and pulling exercising of the neck, chest and abdominal muscles can readily be obtained. The mechanism can be incorporated into a stuffed frame so that the apparatus can be used as a chair in an office or home and, when it is desired to obtain the benefit of stretching exercises, a simple shift of position converts the chair into an exercising toggle cot. Accordingly, apparatus is provided which has convenience features not heretofore available. The mechanism by which the apparatus operates is relatively simple and inexpensive, but provides smooth and reliable operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the apparatus of the present invention;

FIG. 2 is a schematic, side elevation view showing the apparatus in an upright configuration in which it forms a chair;

FIG. 3 is a schematic, side elevation view of the apparatus in one stage of use;

FIG. 4 is a schematic side elevation view of the apparatus in a second stage of use;

FIG. 5 is a detailed view on line 5—5 of FIG. 4, in the direction of the arrows;

FIG. 6 is a cross-sectional view on line 6—6 of FIG. 5, in the direction of the arrows;

FIG. 7 is a cross-sectional view on line 7—7 of FIG. 3, in the direction of the arrows;

FIG. 8 is a cross-sectional view on line 8—8 of FIG. 1, in the direction of the arrows;

FIG. 9 is a cross-sectional view on line 9—9 of FIG. 3, in the direction of the arrows;

FIG. 10 is a cross-sectional view on line 10—10 of FIG. 2, in the direction of the arrows;

FIG. 11 is a cross-sectional view on line 11—11 of FIG. 4, in the direction of the arrows; and

FIG. 12 is a perspective view of the apparatus in collapsed form for easy carrying.

DETAILED DESCRIPTION

Referring to FIG. 1, there is illustrated a particular form of the invention in which a toggle action exerciser is structured in the form of a chair 10. The chair 10 includes a base section 12, a seat frame 14 and a back frame 16. The base section 12 includes a pair of opposing front legs 18 and 20 and a pair of opposing rear legs 22 and 24 crossed and joined intermediately therewith and spaced by a horizontal bar 26 to define opposite sides of the chair 10. The rear legs 22 and 24 curve concavely and then convexly from rear to front in an S-like shape to support the seat frame 14. The front legs 18 and 20 curve concavely from front to rear to a point sufficiently vertically spaced from the seat frame 14 to support a pair of arms 28 and 30 therefrom in cantilever fashion. Forward and rear brace bars 32 and 34, respectively are secured between the bottom portions of the opposing leg pairs 18—20 and 22—24 to give further rigidity to the structure. A hinged set of pivot bars 36 and 38 are secured between respective front and rear legs to prevent collapse of the legs, but allow the base section 12 to be folded when desired. The legs 18, 20, 22 and 24 are each formed of hollow square tubing, bent to the desired shape.

The seat section 14 includes a pair of aesthetically curved side members 40 and 42 formed of hollow square tubing and which are spaced and secured by a pair of transverse brace members 44 and 46. Each brace member 44 and 46 is formed of hollow square tubing, notched at the opposite ends thereof and welded at spaced locations on the side members 40 and 42, as shown at 48 in a broken section of the drawing. A seat cushion 50 is carried by the seat side members 40 and 42 and secured thereto by loops of cloth 52 extending from the seat cushion 50.

The back frame 16 includes a pair of opposing side members 54 and 56 (the member 56 being shown in shadow), and a transverse brace bar, shown in shadow at 58, connecting the side members 54 and 56 across their top ends. A back cushion 60 is secured to the side and top frame members 54, 56, 58 by cloth flaps, such as 52, sewn about the frame members 54, 56 and 58.

The rear ends of the seat section side members 40 and 42 and bottom ends of the back section side members 54 and 56 are pivotally interconnected and positioned so that the seat and back cushions 50 and 60 meet when the exerciser is in an upright position. The seat frame 14 is carried on the base section 12 by the forward extent of the rear legs 22 and 24. The forward extent of these legs is formed with opposing slots, shown in shadow at 64, in which are disposed rollers, shown in shadow at 66, extending intermediately from the seat side members 40 and 42 to define a slidable pivot point for the seat. The back frame 16 is secured by pivot pins extending intermediately from the back section side members 54 and 56 and pivotally connected to the terminal ends of the front legs 18 and 20 and arms 28 and 30. As a result of these pivotal interconnections the exercising device functions as a chair when upright and as a toggle cot when the seat and back frames are disposed to a horizontal position, all as will be described hereinafter in more detail. An electric cord, shown in shadow at 67, may be inserted to connect the rear brace member 46 to the horizontal bar 26.

Referring to FIGS. 2-7 and 11, there are illustrated various positions of the exercising chair 10 and components defining the pivot connections for obtaining freedom of swinging movement of the seat and back frames 14 and 16. In FIG. 2, the chair 10 is shown in an upright position, and in that position serves as a comfortable chair. Such a chair can be utilized as any other piece of furniture, at a desk, in a den, or at pool side. As shown by the dashed lines 64, and as more clearly illustrated in FIGS. 5 and 6, the inner surface of the upper extent of each back leg 22 and 24 is cut away to form a slot 64 which is curved following the line of curvature of the leg 22 or 24 and which defines a channel 68. A pivot pin 70 carries a Teflon roller 66 on one end and is welded to a seat frame side member 40, 42 so that the roller 66 can be slidably disposed within the channel 68. In place of a roller, one can use a Teflon block which slides in the channel 68. The roller 66 is inserted within the channel 68 by means of a keyway 73 for the pivot pin 70 leading into the slot 64 from the front of the leg 22 or 24. The front of the tubular legs 22 or 24 are then closed by a cap 74. The slot 64 is formed with a hump 76 along its lower edge toward the rear thereof so as to define a detent section 78. If a block is used in place of the roller 66, one can incorporate spring-loaded bullet stops within the channel to secure the chair seat in a variety of reclining positions.

When the exerciser chair 10 is in an erect position as illustrated in FIG. 2, the roller bearing is disposed in the detent section 78 with the pivot pin 70 behind the hump 76. The hump 76 prevents the pivot pin 70 from moving forward under the usual forward-directed forces occurring during a normal sitting posture, but when the seat frame 14 is moved more forcefully to a forward direction, the pivot pin 70 can and does ride over the hump 76 into the main portion of the slot 64. When that occurs, the seat frame 14 can be displaced to a forward position as illustrated in FIG. 3.

In this position, the roller 66 slides along the channel 68 until it reaches the end of the slot 64, at which point the seat and back frames 14 and 16 are formed in a line, somewhat beyond the stage illustrated in FIG. 3. At that point, the seat frame 14 is moved to its most forward position whereupon a toggle action is obtained and the junction between the seat and back frames 14 and 16 rise to an inverted V shape as shown in FIG. 4. The inverted V shape becomes sharper under the movement of the user's body and is limited by the suppleness of the user's body. During the increase of sharpness of the inverted V disposition, the roller travels back toward the detent section 78, but in practice does not come close to the detent section. The exercise can be continued with the user flexing his body down, displacing the pivot point as defined by the roller alternately back and forth within the channel 68 causing a succession of toggle actions to alternate V and inverted V positions. If an elastic cord 67 is provided, its spring movement aids in its return to an upright position.

The result is an exercise similar to that obtained by standard toggle-cots, but there are several differences. In one difference, it should be noted that the plane of toggle is somewhat offset from horizontal, which allows the user to exercise while viewing a television set, or the like. Furthermore, in this embodiment, only the seat is displaced facilitating greater control by the user. As a result of the slidable displacement of the pivot point, the toggle action obtained is smooth and can be easily repeated. When it is desired to reassume an upright position, the user may merely move the top of his body forwardly, displacing the seat section 14 rearwardly until the roller pin 70 meets the detent hump 76. Further movement rearwardly causes the pivot pin 70 to rise over the hump 76 to be retained therebehind, securing the chair in an upright position.

Referring to FIG. 7, the manner of interconnection of the seat and back frame side members is illustrated with reference to seat and back side members 42 and 56. The members 42 and 56 are formed with openings aligned with a nylon washer 80 and a hollow cylindrical spacer 82 is inserted through the openings and secured by a headed bolt 84 and locking nut 86 so that the members 42 and 56 can freely pivot.

Referring to FIG. 8, the interconnection between the front and rear legs is illustrated with reference to the legs 18 and 22. The legs 18 and 22 are formed intermediately with openings aligned with a nylon washer 88. The horizontal spacing bar 26 is formed with an extension stud 90, threaded on its outer end and which is disposed through the leg opening and washer 88, and is secured by a locking nut 92.

Referring to FIG. 11, there is illustrated the pivotal connection between the back frame 16 and the rear portion of the front legs as shown with respect to leg 20 and back frame side member 56. The back frame 16 is

in common pivotal connection with the legs 18 and 20 and with the arms 28 and 30. Openings are formed through the back frame side member 56, arm 30 and terminal end of the leg 20 and aligned with a Teflon washer 94 between the back frame 56 and arm 30. The terminal end of the leg 20 is disposed within the arm 30 and a steel spring bar 96 is secured between the outer surface of the leg 20 and inner surface of the arm 30, as will be described hereinafter in more detail with respect to FIG. 10. Spacers 98 are secured through the aligned openings in the back frame member 56, Teflon washer 94, arm 30 and leg 20 by means of a headed bolt 100 and locking nut 102.

In order to facilitate use of the exercising chair 10, a footrest 104 is provided which can be extended from the front end of the seat 14. Referring back to FIGS. 1-4, the footrest 104 is a U-shaped member having tubular end members 106 and 108 of square cross section and which slides within the seat frame side members 40 and 42. When the chair is in an upright position, the footrest 104 can be pushed rearwardly with the end members 106 and 108 entirely within the seat frame side members 40 and 42 so that the footrest 104 does not extend outwardly from the seat frame 14. When it is desired to utilize the chair as an exerciser, the footrest 104 may be extended simply by pulling outwardly thereon until a stop has been reached, and this configuration is shown in FIGS. 3 and 4.

Referring to FIG. 9, a stop mechanism for the footrest 104 is illustrated with respect to the end member 108. The terminal portion of the end member 108 is formed with an opening 110 through which extends a latch rod 112. The latch rod 112 is held by a transverse member 114. A coil spring loads the latch rod 112 to a position extending through the opening 110. The seat frame side member 42 is also formed with an opening 118 which is aligned with the footrest opening 110 when the footrest is in a fully extended position. At that point, the coil spring 116 forces the latch bar 112 through the openings 110 and 118 stopping further outward movement of the footrest 104. The footrest 104 can be released from its locked position merely by pushing rearwardly thereon to rotate the latch bar out of the opening 118. If it is desired to remove the footrest 104 entirely, the latch bar 112 can be pushed up into the end member 108 and held there with the finger while the footrest 104 is nudged outwardly until the latch bar 112 passes the seat frame opening 118.

Referring back again to FIG. 2 in conjunction with FIGS. 10 and 11, another feature of this invention is illustrated. It is often very desirable when engaging in the type of exercises afforded by the toggle action of the present exercising chair to be able to also exercise the pectoral muscles. By utilizing the present chair construction, an exercising feature is provided which is not otherwise available. In accordance with this embodiment, the arms 28 and 30 are spring loaded so that they may be moved inwardly against the force of a strong spring and thereby provide exercise of the pectoral muscles. Furthermore, the arms 28 and 30 may be raised to an upright position so that the exercise can be undertaken while the user assumes a reclined, back-arched posture. In FIG. 2, the arm 30 raised to an upright position is shown in shadow at 30' and a similar view is illustrated in FIG. 4. The mechanism for accomplishing this action is illustrated in detail in FIGS. 10 and 11.

Referring specifically to FIGS. 10 and 11, as previously indicated, the leg 20 is disposed with its terminal end within the tubular shell of the arm 30 and is pivotally secured to the back frame side member 56 via a spacer 98 and Teflon washer 94, secured by a headed bolt 100 and locking nut 102. The material constituting the outer side 120 of the arm 30 is formed with an opening 122 through which the spacer extends and is secured by the head of the bolt 100. The material constituting the opposite inner surface 124 of the arm 30 is formed with an opening 126 which is substantially larger than the opening 122. The rear portions of the Teflon washer 94 abut the rear portions of the arm surface 124 adjacent the rear edge of the opening 126; however, the opening 126 is offset with respect to the spacer 98. As a result of this construction, the arm 30 can move inwardly, as indicated by the arrow 128, to a position 30', the opening 126 being wide enough to travel over the washer 94. The rear edge of the opening 126 is also spaced sufficiently distant from the spacer 98 to allow such movement.

As previously indicated, a steel spring bar 96 is secured within the arm 30 so as to load the arm 30 against inward movement, thereby providing the tension required to exercise the pectoral muscles. The spring bar 96 is welded at its forwardmost end to the inner surface of the inner arm side 124, as indicated at 130, and extends from there to the spacer 98. An arched portion is cut away from the far edge of the bar 96 so that the rear edge of the bar abuts the spacer 98. It will be seen that as the arm 30 is moved inwardly in the direction of the arrow 128, the rearward portions of the spring bar 96 abut against the leg 20 and cause the bar 96 to bow.

Referring to FIG. 11, it will be seen that the top surface 130 of the arm 30 is spaced a sufficient distance from the top edge 132 of the leg 20 so that the arm 30 can be raised simply by rotating it upwardly about the spacer bar 98. On the other hand, the arm 30 is formed with a bottom surface 134 which, when the arm 30 is in a horizontal position, abuts the leg 20 so as to prevent the arm 30 from dropping below that position.

Referring now to FIG. 12, it can be seen that by simply bending the hinged pivot bars 36 and 38, the chair 10 can be readily folded about its pivot joints and, with the arms 30 in an upright position, the chair 10 can be readily moved.

As required, details of an illustrative embodiment of the invention have been disclosed. However, it is to be understood that these details merely exemplify the invention which may take forms different from the specific illustrative embodiment disclosed. For example, the mechanism can be incorporated into a non-folding stuffed desk chair. Therefore, specific structural and functional details are not necessarily to be interpreted as limiting, but as a basis for the claims.

I claim:

1. An exercising device, comprising:
 - a base member;
 - a seat section;
 - a back section;
 - means for pivotally interconnecting said seat and back sections at their junction;
 - means for pivotally connecting said seat and back sections to said base member at respective first and second pivot positions on said base member; and

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shift means for slidably displacing at least one of said pivot positions on said base member for freedom of swinging movement of said seat and back sections on their pivotal interconnection and on their pivotal connections with said base member; said base member comprising a vertically rising member curved along its upper extent to a horizontal direction and carrying said slidably displaceable pivot position on said curved upper extent.

2. The invention according to claim 1 in which said curved upper extent is channeled and said displaceable pivot is carried by a roller slidable within said channel.

3. The invention according to claim 2 in which the rear end of said channel is formed with a detent section for said roller to retain said seat in an extreme rearward position when said back section is upright.

4. An exercising device, comprising:

- a base member;
- a seat section;
- a back section;

means for pivotally interconnecting said seat and back sections at their junction;

means for pivotally connecting said seat and back sections to said base member at respective first and second pivot positions on said base member; and

shift means for slidably displacing at least one of said pivot positions on said base member for freedom of swinging movement of said seat and back sections on their pivotal interconnection and on their pivotal connections with said base member;

said base member comprising forward and rear pairs of oppositely disposed legs, the legs of each said pair crossing, said rear legs supporting said seat on their upper extent, the upper extent of said rear legs being curved to a forward horizontal direction and carrying said slidably displaceable pivot position.

5. An exercising device, comprising:

- a base member;
- a seat section;
- a back section;

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means for pivotally interconnecting said seat and back sections at their junction;

means for pivotally connecting said seat and back sections to said base member at respective first and second pivot positions on said base member;

shift means for slidably displacing at least one of said pivot positions on said base member for freedom of swinging movement of said seat and back sections on their pivotal interconnection and on their pivotal connections with said base member;

a pair of oppositely disposed arm members connected to the upper end of said base member and extending horizontally forward therefrom; and

means for spring loading said arm members on said base member for movement of said arm members toward each other against the force of said spring load.

6. An exercising device, comprising:

- a base member;
- a seat section;
- a back section;

means for pivotally interconnecting said seat and back sections at their junction;

means for pivotally connecting said seat and back sections to said base member at respective spaced first and second pivot positions on said base member for freedom of swinging movement of said seat and back sections on their pivotal interconnection and on their pivotal connections with said base member;

a pair of oppositely disposed arm members connected to the upper end of said base member and extending horizontally forward therefrom; and

means for spring loading said arm members on said base member for movement of said arm members toward each other against the force of said spring load.

7. The invention according to claim 6 in which said arm members are connected to said base member at said second pivot position.

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