

A CHAIR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a chair which has a body of a chair including a seat and a backrest, and a footrest disposed on the front end of said seat, or a chair which has a massage function.

2. Description of the Prior Art

Previously, various kinds of chairs, for example, a chair which has a body of a chair having a seat and a backrest pivotally jointed with the seat and which can be inclined relative to the seat, and a footrest pivotally jointed with the front end of the seat and which can be movable upward and downward on the front end of the seat, a chair-type massage device equipped with several massaging members such as several inflatable and deflatable air bags installed in the seat, backrest and footrest of said chair have been developed. And this chair-type massage device can be used as a common chair without using it as a massage device.

And, these chair-type massage devices such as above-identified, which have a backrest which can be inclined to adjust an angle relative to the seat, and have a footrest that is capable of raising and lowering can be used in two ways of which the backrest is stood and the backrest is laid. When the backrest is stood to be used, the footrest will be generally raised. Also, when a patient seats on the above-identified chair-type massage devices to get massages, the patient may make the backrest be lower and the footrest be raised in order to stretch out on the chair, so that the patient can be in a relaxed position and get a good massage effect.

Therefore, there are two types of chair-type massage devices, the first type has a means for standing and laying the backrest, and the other means for raising and lowering the footrest, and the second type has a link means only for standing and laying the backrest and raising and lowering the footrest at the same time.

When a patient uses the said chair-type massage devices with the backrest inclined to rear, the patient may sit down on the seat, and

operate the said standing and laying means for standing and laying the backrest slowly, however when the backrest is inclined, if the footrest can not be raised, and the legs are still kept hanging from knees, the muscles of body such as abdomen and waist will be pulled strongly.

This problem can be avoided if the footrest has be raised before the backrest is laid. But there is a trouble of different operation in the said chair-type massage devices which have a means for standing and laying the backrest, and the other means for raising and lowering the footrest differently because a patient sits down on the seat, and must operate the means for raising and lowering the footrest to make it raise to a desired position first, and then must operate the means for standing and laying the backrest to make it lay to a desired position.

And also, there is not a trouble of different operation in the chair-type massage devices which have a link means for standing and laying the backrest and raising and lowering the footrest at the same time. However the said chair-type massage devices having said link means has a problem of which the waist part will be pulled strongly because the speed of standing and laying the backrest has been equal to the speed of raising and lowering the footrest, therefore when the backrest is inclined a little, the footrest can not be raised near to the top position. Particularly it is worse for the patients who have a waist pain.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a chair having a link means which is capable of reducing the burden of the waist part such as avoiding the muscles of waist part to be pulled strongly when the backrest is laid down.

Another object of the present invention is to provide a chair having the link means which it has a simple construction.

Further an object of the present invention is to provide a chair which is capable of massaging a user's back, waist, buttocks, thigh and legs in a comfortable position by disposing a massage member in every corresponding part.

In order to achieve these objects, the chair of the present invention is equipped with a chair body having a body frame with a seat and a back

rest jointed to a rear end of the body frame and inclined relative to the body frame,

and a footrest having a legs receiving part, which is pivotally jointed to the front end of the body frame and can be raised and lowered by pivot members,

and a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid and the footrest to be raised,

wherein, the link means can make the backrest be laid down after the footrest has raised near to a top positon.

Thus, the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down to the backrest to rear.

Further the chair of the present invention is equipped with a chair body having a body frame with a seat and a backrest jointed to a rear end of the body frame and which can be inclined relative to the body frame, and a footrest having a legs receiving part, which is pivotally jointed to the front end of the body frame and can be raised and lowered by pivot members,

and a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid down and the footrest to be raised,

wherein, the link means can make the footrest raise near to a top position before the backrest has laid down near to a lowermost positon.

Thus, the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down to the backrest to rear because the legs of a user can be positioned near upward position through the footrest which has been raised near to a top position before the backrest has laid down near to a lowermost position.

Further the chair of the present invention is equipped with a chair body having a body frame with a seat and a backrest jointed to a rear end of the body frame and which can be inclined relative to the body frame, and a footrest having a legs receiving part, which is pivotally

jointed to the front end of the body frame and can be raised and lowered by pivot members,

and a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid down and the footrest to be raised,

wherein, the link means can make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period.

Thus, the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down to the backrest to rear because the raising speed of the legs of a user through the footrest is faster than the inclined speed of the upper-half body of the user to rearward through the backrest in the initial period by which the link means can make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period.

And further the chair of the present invention is equipped with the link means comprising several link members connected sequentially with each other, and a fixed member having a speed change groove which is consisted of a first guide groove sloped to forward steeply and a second guide groove sloped to forward slightly and extended from the first guide groove, and one of said several link members which is sliding the speed change groove through a sliding shaft to make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period through raising and lowering the footrest.

Thus, the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down to the backrest to rearward, and further the construction which is capable of making the raising speed of the footrest in the raised initial period be faster than the one in the raised end period can be made simply.

And further the chair of the present invention is equipped with the link means which is comprised;
a first link member provided on the rear end of a supporting shaft which the backrest is pivotally jointed to, and extended downward from the

supporting shaft,

a second link member having a sliding slit, which one end is jointed to a fulcrum shaft which is positioned on the front part from the supporting shaft and downward from the seat secured on the body frame, a fixed member fixed on the body frame, which has a speed change groove consisted of a circular arcing guide groove formed on the part of the inclining forward and downward from centering the fulcrum shaft, and a straight guide groove extended from the front end of the said circular arcing guide groove and formed to sloping forward slightly, a third link member which one end is pivotally jointed to the part which is far to the distance from the moving centre of the down end of the first link member longer than the radius of the circular arcing guide groove, and another end is engaged with the sliding shaft jointing loosely to the speed change groove together with the second link member,

a fourth link member which one end is pivotally jointed to the part which is far to the distance longer than the radius of the sliding shaft which centers the axis of the fulcrum shaft of the second link member, and another end is engaged with the part which is nearer the footrest than the moving fulcrum of the pivot member of the footrest.

Thus, the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down to the backrest to rear, and further the construction which is capable of changing the said raising speed of the footrest can be made simply since the construction changing the raising speed of the footrest has a rotating plate disposed on the sliding shaft sliding in the speed change groove.

And further the chair of the present invention is equipped with the speed change groove which is formed to a bar-ring groove.

Thus, the construction is capable of making the raising speed of the footrest in the raised initial period be faster than the one in the raised end period can be made simply, and is capable of changing the raising speed simply. Further the fixed member can be made of a metal plate so that the producing cost of it will become lower and the sliding shaft can be moved smoothly too.

And further the chair of the present invention is equipped with massaging members which are installed in the chair body to massage a user' local body part, and a driving means which drives the massaging members.

Thus the chair of the present invention is equipped with massaging members which are installed in the chair body to massage a user' local body part, and a driving means which drives the massaging members, so that the chair has not only said functions, but also can provide a massaging function and a good massaging effect in a relaxed position when the backrest is laid.

Other objects and purposes of the invention will be apparent to persons familiar with devices of this general type upon reading the following specification and inspecting the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side sectional view showing a main part of an embodiment of the chair of the present invention which has a massage function;

Fig. 2 is a side elevational view showing of a link member of above embodiment of the chair of the present invention;

Fig.3 is a side elevational view of a driving member of above embodiment of the chair of the present invention;

Fig.4 is a cross-section view showing above embodiment of the chair of the present invention without the driving member of the body frame of the chair body;

Fig.5 is a cross-section view showing a footrest of above embodiment of the chair of the present invention;

Fig.6 is a plan view showing a footrest and a rotating shaft of above embodiment of the chair of the present invention;

Fig.7 is a magnified plan view of a rotating plate;

Fig.8 is a side elevational view of movement of the backrest and the footrest of above embodiment of the chair of the present invention.

PREFERRED EMBODIMENT OF THE INVENTION

An embodiment of the chair of the present invention adapting air bags as to be massaging members, which can provide a massage effect is explained in Fig.1 to Fig.8.

1 in Fig.1 and Fig.2 etc. shows a chair, the chair 1 is comprised a

chair body 10 and a footrest 50 provided with the front end of the chair body 10, and an air intake/exhaust instrument 2 as to be a driving means.

A body frame 11 of the chair body 10 is comprised of a pair of base frames 12 positioned on right and left sides as shown in Fig.4 etc, a pair of main frames 13 bended and formed like as inverse L-shape and which one end is welded on the rear side of the base frame 12, a pair of supporting frame 14 which upper end is welded on the front end of the main frame 13 and down end is welded on the base frame 12, a pair of reinforce frames 12a which are welded on both base frames 12 and positioned on front side and rear side of the base frames 12, a pair of reinforcement 13a, 13b which are welded on both main frames 13 and positioned on the front side and rear side of the upperward of the main frames.

The bending part of the main frame 13 has a protruding portion 15 protruded to rearward, inwhich has a bore (not shown). And a supporting portion 16 having a bore 16a is disposed and extended on the front end of the main frame 13.

A supporting shaft 20 is pivotally jointed with the protruding portion 15, and a supproting portion 21 having a bore (not shown) is disposed on both ends of the supporting shaft 20, and a shaft 23 is inserted into the bore of supporting portion 21 and bore (not shown) of the protruding portion 15, so that the supporting shaft 20 can be pivotally jointed with the main frame 13 of the body frame 11.

A driving shaft 25 is provided on the supporting shaft 20 as first link member welded and extended on downward from the left end of the supporting shaft 20 as shown in Fig.4. And a bore (not shown) is formed on the front end of the driving shaft 25 consisted of a pair of arms 25a positioned oppositly with each other. A connecting arm 27 is disposed on the supporting shaft 20 welded and extended to downward as same to the part near the driving shaft 25 as shown in Fig.4. And a bore not shown, is formed on the front end of the connecting arm 27 consisted of a pair of arms 27a positioned oppositly with each other.

A pair of supporting rods 28 is welded to and extended to upward on the left end of the supporting shaft 20 as shown in Fig.4. And the

supporting rod 28 is inserted into a pair of connecting staffs 32 which has a hollow part and is welded to a frame part 31 of the backrest 30, as shown in Fig 1 and Fig 4 (shown by double dotted lines), and the connecting staff 32 and supporting rod 28 can be fixed or separated from each other by stop cocks not shown.

In the next, the backrest 30 is consisted of the frame part 31 made of pipe and a back receiving board 33 provided on the frame 31. And a plurality of air bags 35 as a massage member corresponding to the neck, shoulder, back, and waist of a user are installed in the back receiving board 33.

On the right and left sides of the backrest 30, protruded portions 36 are provided longitudinally for securing the body of the user on the backrest.

And the backrest 30 with the frame part 31, the back receiving board 33 and air bags 35 are veiled by a covering 37.

As aforesaid, the connecting staff 32 of the frame part 31 can be inserted into a pair of supporting rods 28 welded to the supporting shaft 20, and can be fixed or separated from each other by stop cocks, so that the backrest 30 can be inclined relative to the shaft 23 as the fulcrum of pivoting through the supporting shaft 20.

A seat supporting board 41 is secured by a screw 42 on the upper side of the main frame 13, a seat 40 can be mounted on the seat supporting board 41 and an air bag 43 is provided with the seat 40 for adapting to thighs and buttocks when a user seats on the seat 40.

A footrest 50 is consisted of a legs receiving part 51 and a connecting member 56 provided with the down side of the legs receiving part 51, and as shown in Fig.6. the legs receiving part 51 is consisted of a bottom wall 52, a central wall 53 raised on the central of the bottom wall 52, and side walls 54, 54 apart from each other and opposited to the central wall 53, and a pair of U-shaped hollows 55 between the side wall 54, 54 and the central wall 53 for receiving legs of a user as shown in Fig.5.

On the opposite sides between the central wall 52 and the side walls 54, 54, air bags 53a, 54a are installed in as massage members.

And the connecting members 56 provided with the down side of the legs

receiving part 51 is consisted of a connecting portions 56b having screw holes 56a and a convexes 56c extended to rearward from the connecting portions 56b. The connecting portions 56b is screwed on the down side of the legs receiving part 51 by screws 57.

Further holes 56d are formed on the front end of the convexes 56c for inserting into a square shaped shaft 62.

And further, the shaft 62 inserting into the hole 56d provided with the convexes 56c is formed to a square shape as above mentioned as shown in Fig. 6, and connecting plates 64 are provided with the both sides of the shaft 62, and a hole is formed on the front end of the shaft 62, so that a shaft 66 can be inserted into the hole and the bore 16a of the protruding portions 16, and the footrest 50 can be pivotally jointed relative to the shaft 66 upward and downward as shown in Fig. 1.

On the left side of the shaft 62, connecting members 63 are disposed as shown in Fig. 6.

A pivoting member 60 is consisted of the connectiong members 63 disposed on the shaft 62 and the connecting plates 64, and the connecting plate 64 can be rotated relative to the shaft 66 provided on the protruding portion 16 to incline the footrest 50.

However the connecting members 63 and the connecting plates 64 can be united according to the position of link members 70, and the connecting members 63, the connectiong plates 64 and convexes 56c of the connecting members 56 can be united too.

Further the link members 70 are consisted of a driving shaft 25 provided with the supporting shaft 20 as to be the first link member, a rotating plate 72 as to be the second link member, a fixed plates 73 as to be the fixed member, a driven shaft 74 as to be the third link member and a connecting staff 75 as to be the fourth link member.

And the driving shaft 25 having a hole on the front end (not shown), is consisted of a pair of arms 25a as aforesaid, and the distance between the center of the hole and the center of the shaft 23 which the supporting shaft 20 is pivotally jointed, that is to say, the radius R1 from the center of the shaft 23 to the center of the hole is longer than the radius R of a circular arcing guide groove 73c provided on a fixed plate 73.

Further the rotating plate 72 is formed to a J-shaped cross section as shown in Fig. 4, and a hole 72c is formed on the upper end of it (as shown in Fig.1 to Fig.3), so that the rotating plate 72 can be pivotally jointed relative to the rod 71 inserted into the hole 72c as to be fulcrum rod.

The left side of the rod 71 is supported by a bearing portion 76 welded to the reinforcement shaft 13a, the other side of the rod 71 is supported by the fixed plate 73.

A sliding slit 72a is formed on the rotating plate 72 which the width is a little wider than the diameter of the sliding shaft 77 for permitting the sliding shaft 77 to slide easily. And the distance between the center of the rod 71 and the center of the sliding shaft 77 when the sliding shaft 77 is positioned on the upper end of the sliding slit 72a, is as same as the radius R of the circular arcing guide groove 73c from the centre of the rod 71.

Further a hole 72b is formed on the rotating plate 72, and is positioned on the lower end from the downward of the sliding slit 72a.

Further and the fixed plate 73, as shown in Fig.4, is formed by bending metal plate to be J-shape, and bended portions 73a on the both sides of it are welded to the supporting frame 14, and a bottom side 73b has a same width as that of the sliding slit 72a of the rotating plate 72. As shown in Fig.7, the circular arcing guide groove 73c having a center line L of the groove width and a radius R from the axis O of the rod 71 as shown in Fig. 7, is provided on the bottom side 73b. And a straight guide groove 73d connected and extended from the front end of the circular arcing guide groove 73c, and having a same width as that of the circular arcing guide groove 73c, and sloped to slanting upward, is provided on the front end of the circular arcing guide groove 73c.

And Further a speed change groove 73m is consisted of the circular arcing groove 73c and the straight guide groove 73d.

The circular arcing guide groove 73c is positioned on where is obliquely in the foreward and downward from the center of the rod 71.

And the circular arcing guide groove 73c and the straight guide groove 73d are formed by a bar-ring groove, so that the sliding shaft 77 can be slided smoothly because the contacting area of the sliding shaft 77 with

the circular arcing guide groove 73c and the straight guide groove 73d can be widened even if the fixed plates 73 are made of metal plate.

The driven shaft 74 is consisted of bar members having a cross section like J-shape as shown in Fig. 4, and a bore (not shown) is formed on the rear side of it, a shaft 74a is inserted into the bore and the bore on the lower end of the driving shaft 25, so that the driven shaft 74 can be pivotally jointed to the driving shaft 25, and the front end of the driven shaft 74 can be pivotally jointed to the sliding shaft 77 inserted into the circular arcing guide groove 73c.

And the sliding slit 72a of the rotating plate 72 is provided to overlap with the straight guide groove 73d of the fixed plate 73 when the rotating plate 72 is rotated relative to the centre of the shaft 71 to come to the end of the circular arcing guide groove 73c, that is to say, come to the part connecting to the straight guide groove 73d (a junction part) according to the sliding of the sliding shaft 77 in the circular arcing guide groove 73c of the fixed plate 73.

And the connecting shaft 75 is formed by bending a cavity square bar to a ^-shaped one as shown in Fig. 4, and the rear end of it is pivotally jointed with the bore 72b provided on the rotating plate 72 by the shaft 75a, and the front end of it is pivotally jointed with a connecting member 63 by the shaft 75b.

Further a driving means 80 is consisted of a driving part 81a having a motor (not shown) provided on the body frame 11 as shown in Fig. 1 and Fig. 2 etc., and a speed reducer (not shown) which a plurality of gears can reduce the rotating speed of the motor, a transferring mechanism 81b having a moving shaft 82 which has teeth provided along the direction of the shaft to engage with the last gear of the speed reducer and moves along the direction of the shaft through the rotating of the motor and changes the direction of rotating power of the motor to the direction of the shaft. And the last gear of the speed reducer and the moving shaft 82 are covered with a bellows 83 formed by elastic rubber so as to prevent oil from flying outside.

And an end of the transferring mechanism 81b is provided to a connecting member 78 by a shaft 78a, the connecting member 78 is welded to near the left side of a bearing arm 76 of the shaft 62, another end

of it is pivotally jointed to the down side of the connecting arm 27 of the supporting shaft 20 by a shaft 27b.

As shown in Fig.1, when the motor of the driving means 80 rotates clockwise, the moving shaft 82 will move to rearward, and when the motor rotates anticlockwise, the moving shaft 82 will move to forward.

Therefore, when the motor rotates clockwise to drive the moving shaft 82 to move to rearward, the connecting arm 27 can be pushed to rearward to link the supporting shaft 20 to rotate anticlockwise, the backrest 30 can be stood up anticlockwise relative to the shaft 23 to reduce the angle between the backrest 30 and the seat 40. On the contrary, the motor rotates anticlockwise to drive the moving shaft 82 to move to forward, the connecting arm 27 can be pulled to forward to link the supporting shaft 20 to rotate clockwise, the backrest 30 can be inclined down clockwise relative to the shaft 23 to expand the angle between the backrest 30 and the seat 40.

The relation between the standing and laying of the backrest 30 and the raising and lowering of the footrest 50 is that when the backrest 30 is positioned to the topmost standing position (the initial position) shown by a double dotted line in Fig.1 and Fig.7, the footrest 50 will be lowered to the lowmost position (the lowmost position) where the bottom of the U-shaped hollows 55 are connected with the floor near to a right angle, and when the backrest 30 is positioned to the lowmost laying position (the lowmost laying position) shown Fig.7, the footrest 50 will be raised to the topmost position (the topmost position) where the bottom of the U-shaped hollows 55 are near to be parallel with the floor and a little lower than the front end of the seat 40.

And an air intake/exhaust instrument 2 provided on the rear end of the body frame 11 is not shown in any figures, it is consisted of a conventional air distributor having an air pump and a rotary valve, and the air distributor is connected with air bags 35, 43, and 53a, 54a installed in the backrest 30, the seat 40 and the footrest 50 by air hoses not shown.

And a control means not shown are provided on the body frame 11 to control the air intake/exhaust instrument 2 and the driving means 80,

and one desired massaging mode can be selected from various kinds of massaging modes to be carried out by operating the control means, the air bags 35, 43, and 53a, 54a will provide air massage by intaking and exhausting air according to the order provided by the selected massage mode. And the various kinds of massaging modes are the conventional massaging modes which include whole body massaging mode, upper-half body massaging mode, lower-half body massaging mode and local body massaging mode.

And an input means not shown is consisted of a remote controller, a desired massaging mode can be selected, and the driving means 80 can be controlled to make the backrest 30 be standed and laid and the footrest 50 be raised and lowered by operating the input means.

5 in Fig.1 and Fig 2 is an armrest provided on the right side and left side of the seat 40.

As shown by double dotted lines in Fig.8, the backrest 30 is positioned on the initial position and the footrest 50 is positioned on the lowmost position. In order to lay the backrest 30 to rearward from said position, a user can operate the input means to make the motor rotate anticlockwise. When the motor rotates anticlockwise, the moving shaft 82 will move slowly to forward to link the connecting arms 27 to move to forward by the rotation, so that the backrest 30 can be rotated clockwise relative to the shaft 23 of the supporting portions 21 provided on both sides of the supporting shaft 20, and starts to lay down gradually.

And when the connecting arms 27 move to forward, the driving shaft 25 provided on the supporting shaft 20 will move to forward. If the driving shaft 25 is moved to forward, the driven shaft 74 will be pushed to move to forward, and then the sliding shaft 77 will move along the circular arcing guide groove 73c. When the sliding shaft 77 moves, the rotating plate 72 provided on the the sliding shaft 77 will start to rotate clockwise relative to the shaft 71.

However, the radius R of the circular arcing guide groove 73c is shorter than the radius R1 which is the distance between the centre of the shaft 23 and the shaft 74a supported by the driven shaft 74 of the driving shaft 25, and more, the distance(radius) between the shaft 71

and the shaft 75a is longer than the radius R of the circular arcing guide groove 73c, so that the moving speed of shaft 75a provided on the rotating plate 72 is faster than the one of the shaft 74a provided on the driving shaft 25. That is to say, the angular velocity of the rotating plate 72 rotating relative to the shaft 71 is bigger than the one of the driving shaft 25 rotating relative to the shaft 23, so that the rotating speed of the rotating plate 72 is faster than the laying speed of the backrest 30.

When the rotating plate 72 rotates clockwise, the connecting shaft 75 will move to forward to make the footrest 50 rotate clockwise for standing up relative to the shaft 66 supporting the connecting plates 64 by the connecting members 63 provided on the shaft 62.

And as above mentioned, the rotating speed of the rotating plate 72 is faster than the laying speed of the backrest 30, so that the raising speed of the footrest 50 is faster than the laying speed of the backrest 30.

The range of which the raising speed of the footrest 50 is faster than laying speed of the backrest 30 is the range of which the sliding shaft 77 moves in the circular arcing guide groove 73c. And when the moving shaft 82 moves to forward again, the sliding shaft 77 will pass through the circular arcing guide groove 73c to come to the straight guide groove 73d by the moving of the driving shaft 25 and driven shaft 74, therefore the rotating speed of the rotating plate 72 passing through the straight guide groove 73d will be slower than the one of it passing through the circular arcing guide groove 73c, and the raising speed of footrest 50 will be slowed.

The raising speed of the footrest 50 when the sliding shaft 77 moves along the circular arcing guide groove 73c is faster than the one when the sliding shaft 77 moves along the straight guide groove 73d because when the sliding shaft 77 is positioned in the circular arcing guide groove 73c, the circular arcing distance of the sliding shaft 77 moving to upward (vertical direction) is longer than the straight distance of the sliding shaft 77 moving to forward (parallel direction) in one time, when the sliding shaft 77 is positioned in the straight guide groove 73d. In other words, the circular arcing guide groove 73c has a circular

arcing slope formed to slanting front end, but the straight guide groove 73d has a slight slanting straight line.

As shown in Fig.8, when the backrest 30 is laid gradually from the initial position to the position shown by a solid line (the middle position), the sliding shaft 77 will be positioned to the junction between the end of the circular arcing guide groove 73c and the end of the straight guide groove 73d.

And after the sliding shaft 77 has come to the junction, the driving shaft 25 is moved to forward again by the rotating of the motor, that is to say, the backrest 30 has moved to the slanting direction (rearward), and the sliding shaft 77 has come to the junction, the sliding slit 72a of the rotating plate 72 will overlap with the straight guide groove 73d of the fixed plate 73, and then the sliding shaft 77 will slide forward along the sliding slit 72a overlapping with the straight guide groove 73d, so that the footrest 50 will be raised slowly because the straight guide groove 73d is sloped slightly.

As above mentioned, when the sliding shaft 77 is moving along the circular arcing guide groove 73c, in other words, until the backrest 30 has reached to the middle position, the footrest 50 can raise faster to reach to the position shown by a solid line in Fig.8 in a speed faster than the one of the backrest 30 because the raising speed of the footrest 50 is faster than the laying speed of the backrest 30 until the backrest 30 has reached to the middle position.

Therefore a user sits on the seat 40 and laies down against the backrest 30, the backrest 30 will lay to rearward. Before the backrest 30 has laid to the middle position, the footrest 50 will raise fast to reach near to the top position (a little lower than the top position) in a speed faster than the one of the backrest 30, so that legs (the calves) positioned on the U-shaped hollows of the footrest 50 can be positioned to a little upperward of the seat 40, and the angle between the upper-half body laying on the backrest 30 and lower-half body (stretched legs and feet) will become to a little, and further the muscles of the waist part are prevented from being stretched strongly so as to reduce the burden of the waist. Particularly it is better for the users who are suffering from a low back pain etc.

Further, while the backrest 30 laies again from the middle position to reach to position shown by a dotted line in Fig.8 (the lowmost position), the raising speed of the footrest 50 will become slowly because the sliding shaft 77 moves along the straight guide groove 73d, so that the footrest 50 will raise slowly from the position shown by a solid line to the top position. The raising speed of the footrest 50 has become slowly from the position shown by a solid line to the top position, however the legs have be lifted up near to the top position, the waist can be protected from being streched strongly.

When the backrest is standed up from the lowmost position, the input means can be operated to make the motor rotate clockwise. By the rotating of the motor, the moving shaft 82 will move gradually to rearward to make the connecting arms 27 move to rearward, so that the driving shaft 25 and the connecting arms 27 can rotate anticlockwise relative to the shaft 23. When the driving shaft 25 moves to rearward, the driven shaft 74 will be moved to rearward too, and the sliding shaft 77 will move to the rear end of the straight guide groove 73d to come to the junction, after moving again, the sliding shaft 77 will enter the circular arcing guide groove 73c and move along the circular arcing guide groove 73c, so that the rotating plate 72 can rotate anticlockwise according to the moving of the sliding shaft 77, and the lowering speed of the footrest 50 while the sliding shaft 77 moves along the circular arcing guide groove 73c is faster than the one when it moves along the straight guide groove 73d.

That is to say, when the backrest 30 is standed up, the footrest 50 will lower slowly from the top position while the backrest 30 is moving between from the lowmost position to the middle position, however the footrest 50 will lower fast in a speed faster than the raising speed of the backrest 30 when the backrest 30 has passed through the middle position.

Thus, when the backrest 30 is standed up, the waist is protected from being streched strongly because legs are positioned upward until the backrest 30 has reached to the middle position. And when the backrest 30 has passed through the middle position, the lowering speed of the footrest 50 will become faster, however in this time, the upper-half

body laid on the backrest 30 has been stood up to the middle position and the legs bended from knees can be moved to downward, so that waist is protected from being stretched strongly.

The chair as above mentioned, has a link means 70 which control the raising speed of the footrest 50 in the initial period is faster than the one in the end period by the link means 70, so that the raising speed of legs with the footrest 50 in the initial period is faster than the inclining speed of upper-half body with the backrest 30, and then the waist can be prevented from being stretched suddenly and strongly.

And the link means 70 is comprised of the driving shaft 25 pivotally jointed to the rear side of the body frame 11 relative to the shaft 23 provided with the supporting shaft 20, which is connected with the backrest 30 pivotally jointed to the chair body 10 through the supporting shaft 20,

the rotating plate 72 which one end is connected with the shaft 71 to rotate relative to the shaft 71 provided on the frontward of the supporting shaft 20 of the body frame 11, and has the sliding slit 72a,

the fixed plate 73 having the speed change groove 73m which is consisted of the circular arcing guide groove 73c formed on the lower part of the slanting frontward from the center of the shaft 71 and the straight guide groove 73d formed on the front end and extended to the slanting forward of the circular arcing guide groove 73c,

the driven shaft 74 which one end is pivotally jointed to the downward of the driving shaft 25 and the other end is connected to the sliding shaft 77 inserted in the speed change groove 73m with the rotating plate 72,

the connecting staff 75 which one end is connected with the part of the rotating plate 72 being apart from the distance longer than the distance between the shaft 71 and the sliding shaft 77, and another end is pivotally jointed to the rotating member 60 of the footrest 50,

so that the changing of the raising speed of the footrest 50 can be carried out by a simple construction consisted of the speed change groove 73m and the rotating plate 72 connected with the sliding shaft 77 sliding in the speed change groove 73m.

And the raising speed of the footrest 50 in the initial period can be

changed freely by which the radius of the circular arcing guide groove 73c is changed only without changing the sizes of the rotating plate 72 and the driving shaft 25 etc., and the range where the footrest 50 can be raised fast, can be set up freely by which the length of the circumference is changed because the speed change groove 73m is consisted of the circular arcing guide groove 73c and the straight guide groove 73d.

Further the speed change groove 73m consisted of the circular arcing guide groove 73c and the straight guide groove 73d is formed to be a bar-ring groove, so that the fixing members can be made of metal plate and the sliding width of the sliding shaft 77 can be widened, and the sliding shaft 77 can slide smoothly too.

The air bags 35, 43, 53a and 54a as to be massaging members are provided with the backrest 30, the seat 40 and the footrest 50 which support a user' body, and the intake/exhaust instrument 2 as to be a driving means to drive a massaging member is provided, so that the chair can be used as a massage device. And more, the user can get a good massaging effect in a relaxed position when the backrest 30 has been laid down.

In above embodiment, the speed change groove 73m is consisted of the circular arcing guide groove 73c and the straight guide groove 73d, and the link means 70 is comprised a plurality of link members having the driving shaft 25, the driven shaft 74, the rotating plate 73 and the connecting staff 75, and the driven shaft 74 and the rotating plate 73 are connected to the sliding shaft 77 which slides in the circular arcing guide groove 73c and the straight guide groove 73d, however a first guide groove can be formed on the fixed plate 73 to slope forward and upperward, and has a steep gradient, and a second guide groove can be formed and connected with the front end of the first guide groove to slope forward and upperward, and has a slight gradient, and the first guide groove and the second guide groove forms a speed change groove, the first guide groove and the second guide groove will be slid by the sliding shaft 77 pivotally jointed to the driven shaft 74 and the rotating plate 73 too.

And the bore connected with the shaft 71 of the rotating plate 72 is

formed to be a long opening like a slit, so that the sliding shaft 77 can make the first guide groove having a steep gradient move smoothly by which the rotating plate 72 will move relative to the shaft 71 when the sliding shaft 77 passes through the steep slanting guide groove.

That is to say, the circular arcing guide groove 73c is equivalent to the first guide groove to slope forward and upperward, and has a steep gradient, the inclined plane of sloping can be either a curve line shape or a straight line shape. And the straight guide groove 73d is equivalent to the second guide groove having a slight gradient.

And also the number of link members can be set up freely according to the detail design.

Although the standing and laying motion of the backrest 30 and the raising and lowering motion of the footrest 50 are driven by the driving means 80 easily, the driving means 80 can be omitted in order to cut the cost of the production.

Without the driving means 80, a user can sit down the seat 40 and laies down on the backrest 30, and pushes the backrest 30 to lay. When the backrest 30 laies rearward, the supporting 20 will rotate relative to the shaft 23 to make the front end of the driving shaft 25 move to forward. As above mentioned, acoording to the moving of the driving shaft 25, the footrest 50 can be raised. In other words, that is to say, a user can make the footrest 50 be raised by laying the back to push the backrest 30 to lay rearward by himself whitout the driving means 80.

And although the link means 70 linking the backrest 30 to stand up and lay down and the footrest 50 to raise and lower, is consisted of the driving shaft 25, the driven shaft 74, the rotating plate 72, the fixed plate 73 and the connecting staff 75, a link means linking the footrest 50 to raise and lower and another link means linking the backrest 30 to stand up and lay can be provided with a motor and a speed reducer differently, and make the raising speed of the footrest 50 in the initial period be faster than the one in the end period. In this way, the cost for production will become high, but the speed of raising and lowering can be set up minutely because the controlling of the raising and lowering speed can be controlled by a controllor means.

And also air bags are provided with the chair body 10 as massaging

members, however the air bags can be omitted when the chair is used as a common chair. And the massaging members can be a projection, not limited air bags, the projection can be moved by a driving means having a motor too.

Further in the embodiment mentioned above, the raising speed of the footrest 50 in the initial period until the footrest 50 has reached near the top position is faster than the one in the end period, and the waist part can be protected from being pulled strongly. However the footrest 50 is raised near to the top position before the backrest 30 starts to lay, or the footrest 50 is raised near to the top position before the backrest 30 reaches to the lowmost position, the waist part can be also protected from being pulled strongly too. And furthermore, in respect of the controlling, it is preferable to provide a motor as the driving means for raising and lowering the footrest 50 and a speed reducer as the driving means for standing and laying the backrest 30 differently.

The present invention is equipped with a chair body having a body frame with a seat and a backrest pivotally jointed to rear end of the body frame and which can be inclined relative to the body frame,

and a footrest having a legs receiving part, which is pivotally jointed to the front end of the body frame and can be raised and lowered by pivot members,

and a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid and the footrest to be raised,

wherein the link means can make the backrest be laid after the footrest has raised near to a top position so that the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly, can be reduced when the upper-half body of a user is laid down to the backrest to rearward.

Further the present invention is equipped with a chair body having a body frame with a seat and a backrest pivotally jointed to rear end of the body frame and which can be inclined relative to the body frame,

and a footrest having a legs receiving part, which is pivotally jointed to the front end of the body frame and can be raised and lowered

by pivot members,

and a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid and the footrest to be raised,

wherein the link means can make the footrest raise near to a top position before the backrest has laid down near to a lowermost position so that the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly, can be reduced when the upper-half body of a user is laid down with the backrest to rearward because the legs of a user can be near to upward position through the footrest which has been raised near to a top position before the backrest has laid near to a lowermost position.

Further the present invention is equipped with a chair body having a body frame with a seat and a backrest pivotally jointed to rear end of the body frame and which can be inclined relative to the body frame,

and a footrest having a legs receiving part, which is pivotally jointed to the front end of the body frame and can be raised and lowered by pivot members,

and a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid and the footrest to be raised,

wherein the link means can make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period so that the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down the backrest to rearward because the raising speed of the legs of a user through the footrest is faster than the laying speed of the upper-half body of the user to rearward through the backrest in the initial period by which the link means can make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period.

Still further the present invention is equipped with the link means comprising several link members connected sequentially with each other, and a fixed member having a speed change groove which is consisted of a first guide groove sloped to forward steeply and a second guide groove

sloped to forward slightly and extended from the first guide groove, and one of the several link members which is sliding the speed change groove through a sliding shaft to make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period through raising and lowering the footrest, so that the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down to the backrest to rearward, and further the construction which is capable of making the raising speed of the footrest in the raised initial period be faster than the one in the raised end period can be made simply.

And still further the present invention is equipped with the link means comprised;

a first link member provided on the rear end of a supporting shaft which the backrest is pivotally jointed to, and extended downward from the supporting shaft,

a second link member having a sliding slit, which one end is jointed to a fulcrum shaft which is positioned on the front part from the supporting shaft and downward from the seat secured on the body frame, a fixed member fixed on the body frame, which has a speed change groove consisted of a circular arcing guide groove formed on the part of the sloping forward and downward from the center of the said fulcrum shaft, and a straight guide groove extended from the front end of the said circular arcing guide groove and formed to sloping forward slightly, a third link member which one end is pivotally jointed to the part which is apart from the distance from the moving centre of the down end of the first link member longer than the radius of the circular arcing guide groove, and another end is engaged with the sliding shaft jointing loosely with the speed change groove together with the second link member,

a fourth link member which one end is pivotally jointed to the part which is far from the distance longer than the radius of the sliding shaft which centers the axis of the fulcrum shaft of the second link member, and another end is engaged with the part which is nearer the footrest than the moving fulcrum of the pivot member of the footrest, so

that the burden of the waist part such as avoiding the muscles of waist part to be pulled suddenly and strongly can be reduced when the upper-half body of a user is laid down to the backrest to rearward, and further the construction which is capable of changing the raising speed of the footrest can be made simply since the construction changing the raising speed of the footrest has a rotating plate disposed on the sliding shaft sliding in the speed change groove.

And still further the present invention is equipped with the speed change groove which is formed to a bar-ring groove, so that the construction which is capable of making the raising speed of the footrest in the raised initial period be faster than the one in the raised end period can be made simply, and which is capable of changing the raising speed simply. Further the fixed member can be made of a metal plate so that the producing cost of it will become lower and the sliding shaft can be moved smoothly too.

And still further the present invention is equipped with massaging members installed in the chair body to massage a user' local body, and a driving means which drives the massaging members, so that the chair of the present invention equipped with some massaging members which are installed in the chair body to massage a user' local body, and a driving means which drives said massaging members, has not only said functions, but also can provide a massaging function and a good massaging effect in a relaxed position when the backrest is laid down.

Although a particular preferred embodiment of the invention has been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, lie within the scope of the present invention.



What is claimed is:

1. A chair comprising:

a chair body having a body frame with a seat and a backrest pivotally jointed to rear end of the body frame and which can be inclined relative to the body frame,

a footrest having a legs receiving part, which is pivotally jointed to the front end of the body frame and can be raised and lowered by pivot members,

a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid and the footrest to be raised,

wherein the link means can make the backrest be laid after the footrest has raised near to a top position.

2. A chair comprising:

a chair body having a body frame with a seat and a backrest pivotally jointed to rear end of the body frame and which can be inclined relative to the body frame,

a footrest having a legs receiving part, which is pivotally jointed to the front end of the body frame and can be raised and lowered by pivot members,

a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid and the footrest to be raised,

wherein the link means can make the footrest raise near to a top position before the backrest has laid near to a lowermost position.

3. A chair comprising:

a chair body having a body frame with a seat and a backrest pivotally jointed to rear end of the body frame and which can be inclined relative to the body frame,

a footrest having a legs receiving part, which is pivotally jointed to the front end of said body frame and can be raised and lowered by pivot members,

a link means which can link the backrest to be standed and the footrest to be lowered, or link the backrest to be laid and the



footrest to be raised,

wherein the link means can make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period.

4.A chair according to claim 3, wherein the link means comprising several link members connected sequentially with each other, and a fixed member having a speed change groove which is consisted of a first guide groove sloped to forward steeply and a second guide groove sloped to forward slightly and extended from the first guide groove, and one of several link members which is sliding the speed change groove through a sliding shaft to make the raising speed of the footrest in the raised initial period be faster than the one in the raised end period through raising and lowering the footrest.

5.A chair according to claim 3, wherein the link means comprising;
a first link member provided on the rear end of a supporting shaft which the backrest is pivotally jointed to, and extended downward from the supporting shaft,
a second link member having a sliding slit, which one end is jointed to a fulcrum shaft which is positioned on the front part from the supporting shaft and downward from the seat secured on the body frame,
a fixed member fixed on the body frame, which has a speed change groove consisted of a circular arcing guide groove formed on the part of the sloping forward and downward from the center of the said fulcrum shaft, and a straight guide groove extended from the front end of the said circular arcing guide groove and formed by sloping forward slightly,
a third link member which one end is pivotally jointed to the part which is apart from the distance from the moving centre of the down end of the first link member longer than the radius of the circular arcing guide groove, and another end is engaged with the sliding shaft jointing loosely with the speed change groove together with the second link member,
a fourth link member which one end is pivotally jointed to the part which is far from the distance longer than the radius of the sliding



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shaft which centers the axis of the fulcrum shaft of the second link member, and another end is engaged with the part which is nearer the footrest than the moving fulcrum of the pivot member of the footrest.

6.A chair according to claim 3 and claim 5, wherein the speed change groove is formed to a bar-ring groove.

7.A chair according to claim 1 to claim 6, wherein massaging members are installed in the chair body to massage a user' local body, and a driving means is provided to drive the massaging members.