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(54) **Relaxation apparatus**

(57) **OBJECT**

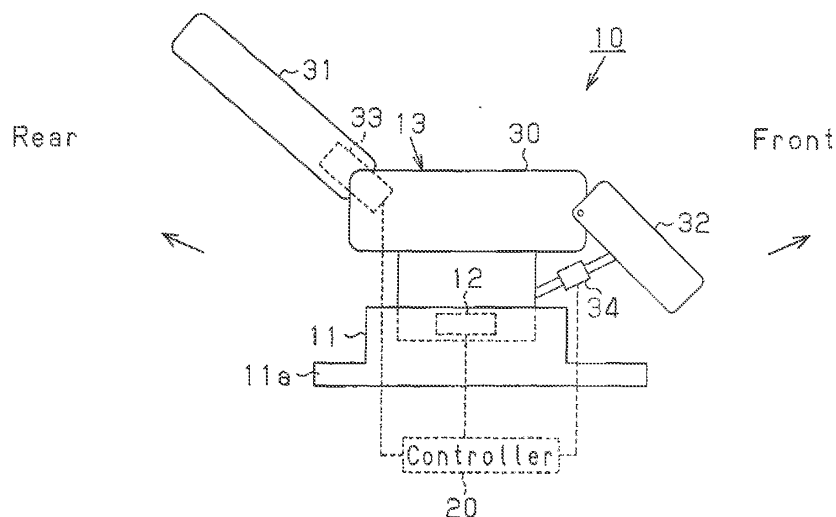
A relaxation apparatus that rocks and moves a body and tilts a body support means to generate an effective relaxation effect.

SOLUTION

A reclining mechanism 33, which serves as a posi-

tion adjustment means, increases the angle between a backrest 31 and a seat 30 from a basic position to a sleep position when a body support 13 is moving toward the front. Further, the reclining mechanism 33 decreases the angle between the backrest 13 and the seat 30 from the sleep position to the basic position when the body support 13 is moving toward the rear.

Fig.1



Description

TECHNICAL FIELD

[0001] The present invention relates to a relaxation apparatus having a relaxation effect on a user.

BACKGROUND ART

[0002] In the prior art, patent document 1 describes an example of a relaxation apparatus that generates a relaxation effect by rocking the body of a user seated on a chair-type body support.

[0003] The relaxation apparatus of patent document 1 includes a body support, which is formed by a seat (lower body support portion in patent document 1) and a backrest (upper body support portion in patent document 1), and a rocker drive device (vibrating means in patent document 1), which rocks and moves the body support toward the front and rear. The rocker drive device rocks and moves the body support in the front and rear directions.

[0004] Further, in such a relaxation apparatus, during the rocking in the front and rear directions, the angle of at least either one of the seat and backrest is controlled so that the user's feet does not become higher than the user's head. Thus, the feet are always lower than the head, and the head side never moves below the feet in the vertical direction. As a result, the head side is not felt as if it is sliding off the chair, and an effective relaxation effect is generated.

[Patent Document 1] Japanese Patent No. 2697864

SUMMARY OF THE INVENTION

PROBLEMS THAT ARE TO BE SOLVED BY THE INVENTION

[0005] The above-described relaxation apparatus is operated so that a tilting motion of the backrest, which occurs when necessary so that the feet are always lower than the head, and a rocking motion of the body support are performed independently. In some cases, these motions offset each other. This may lead to an awkward motional feel, and an effective relaxation effect may not be generated.

[0006] Accordingly, it is an object of the present invention to provide a relaxation apparatus that generates an effective relaxation effect through a body rocking motion and a body support means tilting motion.

MEANS FOR SOLVING THE PROBLEMS

[0007] To achieve the above object, a first embodiment of the present invention is a relaxation apparatus including a body support means, a rocker drive means, and a control means. The body support means includes a seat, on which a user can sit, and a connected supporter, which

is connected to the seat to support part of a user's body. The rocker drive means rocks and moves the body support means in front and rear directions. The control means controls the rocker drive means to perform relaxation rocking. A position adjustment means shifts the body support means between a basic position, a sleep position, at which the angle between the seat and the connected supporter is greater than that at the basic position, and an upright position, at which the angle between the seat and the connected supporter is less than that at the basic position. The position adjustment means changes the angle of the connected supporter relative to the seat when the body support means is moving to at least either one of the front and the rear in order to move the body support means from the basic position to the sleep position or the upright position.

[0008] In the first embodiment, the body support means includes the position adjustment means that shifts the body support means between the basic position, the sleep position, at which the angle between the seat and the connected supporter is greater than that at the basic position, and an upright position, at which the angle between the seat and the connected supporter is less than that at the basic position. The position adjustment means changes the angle of the backrest relative to the seat when the body support means is moving to at least either one of the front and the rear in order to move the body support means from the basic position to the sleep position or the upright position. As a result, the rocking motion of the body support means, the seat of the body support means, and the tilting motion of the connected supporter cooperate to generate a relaxation operation in a synergistic manner. Thus, an effective relaxation effect is generated.

[0009] In a second embodiment, with the relaxation apparatus of the first embodiment, the connected supporter includes a backrest tiltably fixed to the rear of the seat, and the position adjustment means increases the angle between the backrest and the seat when the body support means is moving toward the front in order to move the body support means from the basic position to the sleep position.

[0010] In the second embodiment, the connected supporter includes a backrest tiltably fixed to the rear of the seat, and the position adjustment means increases the angle between the backrest and the seat when the body support means is moving toward the front in order to move the body support means from the basic position to the sleep position. In this state, at least either one of the seat and the backrest is tilted and moved toward the sleep position so that the user's body automatically moves toward the sleeping position and the user's body becomes close to a straight state. Thus, a floating feel is apt to be generated relatively around the waist.

[0011] In a third embodiment, with the relaxation apparatus of the second embodiment, the position adjustment means decreases the angle between the backrest and the seat when the body support means is moving

toward the rear in order to move the body support means from the sleep position to the basic position.

[0012] In the third embodiment, the position adjustment means decreases the angle between the backrest and the seat when the body support means is moving toward the rear in order to move the body support means from the sleep position to the basic position. This allows for repetitive movement toward the sleeping position by tilting at least one of the seat and the backrest when the body support means is moving toward the front and allows for the effect of the second embodiment to be repetitively generated.

[0013] In a fourth embodiment, with the relaxation apparatus of the second or third embodiment, the connected supporter includes an ottoman fixed in a relatively tiltable manner to the front of the seat, and the position adjustment means increases the angle between the ottoman and the seat when the body support means is moving toward the front in order to move the body support means from the basic position to the sleep position.

[0014] In the fourth embodiment, the connected supporter includes the ottoman fixed in a relatively tiltable manner to the front of the seat, and the position adjustment means increases the angle between the ottoman and the seat when the body support means is moving toward the front in order to move the body support means from the basic position to the sleep position. This moves the user's legs toward the sleep position, and the user is further apt to having a floating feel. This generates a further effective refreshing effect.

[0015] In a fifth embodiment, with the relaxation apparatus of the fourth embodiment, the position adjustment means decreases the angle between the ottoman and the seat when the body support means is moving toward the rear in order to move the body support means from the sleep position to the basic position.

[0016] In the fifth embodiment, the position adjustment means decreases the angle between the ottoman and the seat when the body support means is moving toward the rear in order to move the body support means from the sleep position to the basic position. This allows for repetitive movement toward the sleeping position by tilting at least one of the seat and the ottoman when the body support means is moving toward the front and allows for the effect of the fourth embodiment to be repetitively generated.

[0017] In a sixth embodiment, with the relaxation apparatus of the fifth embodiment, in order to refresh the user who is in a relaxed state, the position adjustment means decreases the angle between the backrest and the seat when the body support means is moving toward the rear in order to move the body support means from the basic position to the upright position.

[0018] In the sixth embodiment, in order to refresh the user who is in a relaxed state, the position adjustment means decreases the angle between the backrest and the seat when the body support means is moving toward the rear in order to move the body support means from

the basic position to the upright position. That is, to refresh the user who is in a relaxed state, the angle between the backrest and the seat is decreased when the body support means is moving toward the rear so that the user's body is held upright. This has a refreshing effect on the user.

[0019] In a seventh embodiment, with the relaxation apparatus of the sixth embodiment, the position adjustment means increases the angle between the backrest and the seat when the body support means is moving toward the front during the refreshing in order to move the body support means from the upright position to the basic position.

[0020] In the seventh embodiment, the position adjustment means increases the angle between the backrest and the seat when the body support means is moving toward the front during the refreshing in order to move the body support means from the upright position to the basic position. This allows for repetitive movement toward the upright position by tilting at least one of the seat and the backrest when the body support means is moving toward the rear and allows for the effect of the sixth embodiment to be repetitively generated.

[0021] In an eighth embodiment, with the relaxation apparatus of the sixth or seventh embodiment, the position adjustment means decreases the angle between the ottoman and the seat when the body support means is moving toward the rear during the refreshing in order to move the body support means from the basic position to the upright position.

[0022] In the eighth embodiment, the position adjustment means decreases the angle between the ottoman and the seat when the body support means is moving toward the rear during the refreshing in order to move the body support means from the basic position to the upright position. This moves the user's legs (mainly, below the knees) to a vertically lower position so as to move the joints and the like of the user's body, stimulate motor sensation, and allow for the weight of the legs to be felt more easily so as to awaken the user.

[0023] In a ninth embodiment, with the relaxation apparatus of the eighth embodiment, the position adjustment means increases the angle between the seat and the ottoman when the body support means is moving toward the front during the refreshing in order to move the body support means from the upright position to the basic position.

[0024] In the ninth embodiment, the position adjustment means increases the angle between the seat and the ottoman when the body support means is moving toward the front during the refreshing in order to move the body support means from the upright position to the basic position. This allows for repetitive movement toward the upright position by tilting at least one of the seat and the ottoman when the body support means is moving toward the rear and allows for the effect of the eighth embodiment to be repetitively generated.

[0025] In a tenth embodiment, with the relaxation ap-

paratus of the ninth embodiment, the position adjustment means moves the backrest relative to the seat.

[0026] In the tenth embodiment, the position adjustment means moves the backrest relative to the seat. For example, when the seat is horizontal at the basic position, the movement of the backrest relative to the seat causes the sleep position to become horizontal. This disperses the force produced by the user's weight and received by each part of the body and generates a further effective relaxation effect. Further, if the backrest is tilted (moved toward the rear) toward the sleep position when the body support 13 is being moved toward the front, the user's head does not move toward the front or rear. Thus, the semicircular canals, which are for keeping balance, do not move toward the front and rear. This reduces dizziness such as motion sickness. Further, for example, after the refreshing, in a state in which the seat is horizontal at the basic position, the backrest is moved relative to the seat to hold the user's body upright. In contrast, if the seat were to be moved relative to the backseat to the upright position, the seat would approach a vertical side from a horizontal side. This would result in the user's own weight (particularly, the weight of the lower body) being applied to the waist. Thus, too much load would be applied to the user such that the user cannot be comfortably aroused (awakened). In the present embodiment, which moves the backrest relative to the seat, the application of the user's own weight to the waist is suppressed. This allows for the user to be comfortably aroused (awakened) and generates a further effective refreshing effect.

[0027] In an eleventh embodiment, with the relaxation apparatus of the ninth embodiment, the position adjustment means moves the ottoman relative to the seat.

[0028] In the eleventh embodiment, the position adjustment means moves the ottoman relative to the seat. For example, when the seat is horizontal at the basic position, the ottoman is moved relative to the seat so that the sleep position approaches a horizontal state. This disperses the force applied by the user's own weight to each part of the user's body and generates a further effective relaxation effect. For example, if the seat were to be moved relative to the ottoman toward the sleep position, the seat would be tilted relative to a horizontal plane (floor surface) from a horizontal state. As a result, the user's body would be held upright, and an effective relaxation effect cannot be generated. Accordingly, the structure of the present invention, which moves the ottoman relative to the seat, is effective. Further, during the refreshing, in a state in which the seat is generally horizontal at the basic position, the user's own weight would be applied to the waist. Thus, too much load would be applied to the user such that the user cannot be comfortably aroused (awakened). In the present embodiment, which moves the backrest relative to the seat, the application of the user's own weight to the waist is suppressed. This allows for the user to be comfortably aroused (awakened) and generates a further effective refreshing effect. Accordingly, the structure of the present invention, which

moves the ottoman relative to the seat, suppresses the user's own weight from being applied to the waist. This allows for the user to be comfortably aroused (awakened) and generates a further effective refreshing effect. Further, the seat generally supports relatively heavy parts of the user's body, such as the buttocks and the thighs, and the ottoman supports relatively light parts such as the legs. Thus, the ottoman is easily moved relative to the seat in the structure of the present invention. That is, the drive force for moving the ottoman relative to the seat may be decreased, and a smaller driving mechanism may be used. This consequently avoids enlargement of the relaxation apparatus.

[0029] In a twelfth embodiment, with the relaxation apparatus of the eleventh embodiment, the position adjustment means shifts the body support means to each position when the body support means starts to move toward the front or the rear.

[0030] In the twelfth embodiment, the position adjustment means shifts the body support means to each position when the body support means starts to move toward the front or the rear. This increases the cooperative feel of position shifts (tilting motion) and the rocking motions of the body support, and thereby allows for a further effective relaxation effect and refreshing effect to be generated.

[0031] In a thirteenth embodiment, with the relaxation apparatus of the eleventh embodiment, the position adjustment means is configured so that a movement change amount is adjustable for moving the connected supporter to each position.

[0032] In the thirteenth embodiment, the position adjustment means is configured so that a movement change amount is adjustable for moving the connected supporter to each position. Here, for example, the connected supporter will be described as a backrest. The change amount for the tilting motion of the backrest is adjusted in accordance with the rocking motion, and the position of the user's head during the rocking motion may be set to be in the vicinity of a rotation center of the rocking motion. Thus, movement of the semicircular canals, which are for keeping balance, is suppressed. This reduces dizziness such as motion sickness and has an effective relaxation effect.

[0033] In a fourteenth embodiment, with the relaxation apparatus of the eleventh embodiment, a reciprocating frequency for when the position adjustment means shifts the body support means to each position and a rocking frequency for the body support means generated by the rocker drive means are separately settable.

[0034] In the fourteenth embodiment, the reciprocating frequency for when the position adjustment means shifts the body support means to each position and the rocking frequency for the body support means generated by the rocker drive means are separately settable. This increases movement variations of the apparatus and allows for shifting to each position at a frequency higher than, for example, the frequency of the rocking motion. Thus, a

stimulus differing from that of the rocking motion may be applied to the user, and an effective refreshing effect may be generated.

EFFECT OF THE INVENTION

[0035] The present invention provides a relaxation apparatus that generates an effective relaxation effect through a body rocking motion and a body support means tilting motion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036]

Fig. 1 is a schematic diagram of a relaxation apparatus according to the present embodiment;
 Fig. 2 is an explanatory diagram showing a body support of the relaxation apparatus at a basic position;
 Fig. 3 is an explanatory diagram showing the body support of the relaxation apparatus at a sleep position
 Fig. 4 is an explanatory diagram showing the body support of the relaxation apparatus at an upright position
 Fig. 5 is an explanatory diagram showing the frequency and amplitude of rocking motions in the relaxation apparatus;
 Fig. 6 is an explanatory diagram showing the rocking motions for each position in the relaxation apparatus;
 Fig. 7 is an explanatory diagram showing the rocking motions for each position in the relaxation apparatus;
 Fig. 8 is an explanatory diagram showing a rocker drive device;
 Fig. 9 is an explanatory diagram showing a tilting motion of the backrest and an operation performed by a direct-drive mechanism;
 Fig. 10 is an explanatory diagram showing the tilting motion of the backrest; and
 Figs. 11(a) and 11(b) are explanatory diagrams showing the rotation center of the tilting motion, the tilting motion of the backrest, and an inflation operation of an airbag.

DESCRIPTION OF THE REFERENCE CHARACTERS

[0037] 10 ... relaxation apparatus, 12 ... rocker drive device serving as a rocker drive means, 13 ... body support serving as a body support means, 20 ... controller serving as a control means, 30 ... seat, 31 ... backrest serving as a connected supporter, 32 ... ottoman serving as a connected supporter, 33 ... reclining mechanism serving as a position adjustment means, 34 ... lift mechanism serving as a position adjustment means.

BEST MODE FOR CARRYING OUT THE INVENTION

[0038] One embodiment according to the present invention will now be discussed with reference to the drawings.

[0039] Fig. 1 is a schematic diagram showing a relaxation apparatus of the present embodiment. Referring to Fig. 1, the relaxation apparatus 10 includes a base 11 having a bottom portion 11a, which is placed on a floor (not shown). The relaxation apparatus 10 further includes a rocker drive device 12, which serves as a rocker drive means arranged in the base 11, and a body support 13, which serves as a body support means rocked by the rocker drive device 12.

[0040] The rocker drive device 12 is controlled by a controller 20, which serves as a control means, to rock and move the body support 13 in front and rear directions like a rocking chair or the like.

[0041] The body support 13 includes a seat 30, which is tiltably supported by the base 11, a backrest 31, which serves as a connected supporter tiltably fixed to the rear of the seat 30, and an ottoman 32.

[0042] The backrest 31 includes a relining mechanism 33, which is controlled by the controller 20 and serves as a position adjustment means for tilting the backrest 31. When the seat 30 is horizontal, the backrest 31 is tilted when necessary in a range in which the reclining angle θ_1 between the seat 30 and the backrest 31 is 120 degrees to 170 degrees.

[0043] Further, the ottoman 32 includes a lift mechanism 34, which is controlled by the controller 20 and serves as a position adjustment means for tilting the ottoman 32 relative to the seat 30. The ottoman 32 is tilted when necessary in a range in which the angle θ_2 between the seat 30 and the ottoman 32 is 130 degrees to 170 degrees. The angle θ_2 between the seat 30 and the ottoman 32, which is set in a state in which the seat 30 is horizontal, may be changed in accordance with the angle of the seat 30.

[0044] The operation of the relaxation apparatus 10 will now be discussed with reference to Figs. 1 to 7.

[0045] The controller 20 is set to operate in various types of operations modes, such as a mode for driving the rocker drive device 12 to perform only relaxation rocking with the body support 13 and a mode for performing such relaxation rocking in cooperation with the backrest 31. One of these modes is a relaxation rocking mode implementing a refreshment mode. In this operation mode, [relaxation rocking] having a relaxation effect on the user is first performed. After a predetermined time elapses, [relaxation rocking] is switched to [refreshment rocking], and then the operation mode is completed.

[Relaxation Rocking]

[0046] In order to draw a user from an awakened state to a relaxed state, as shown in Fig. 5, first, the controller 20 controls the rocker drive device 12 (refer to Fig. 1) so

that the rocking interval (frequency) of the rocking motion performed on the body support 13 (refer to Fig. 1) is decreased in steps of 0.05 Hz as time elapses starting from, for example, 0.35 Hz, until reaching 0.2 Hz after a predetermined time A. At the same time, the controller 20 controls the rocker drive device 12 so that the rocking motion has a random rocking width (amplitude).

[0047] Further, together with the relaxation rocking motion, the controller 20 repetitively tilts the backrest 31 and the ottoman 32 so that the body support 13 is moved between a basic position (refer to Fig. 2) and a sleep position (refer to Fig. 3). In detail, at the same time as when the body support 13 moves forth toward the front as shown in Fig. 6, the controller 20 controls the reclining mechanism 33 so that the reclining angle θ_1 increases from 150 degrees at the basic position to 170 degrees at the sleep position to tilt the backrest 31 to the rear and approach the sleep position. Simultaneously, as shown in Fig. 6, the controller 20 controls the lift mechanism 34 so that the angle θ_2 between the ottoman 32 and the seat 30 is increased from 160 degrees at the basic position to 170 degrees at the sleep position to tilt the ottoman 32 toward the sleep position. Then, at the same time as when the body support 13 moves back toward the rear, the controller 20 controls the reclining mechanism 33 so that the reclining angle θ_1 decreases from 170 degrees at the sleep position to 150 degrees at the basic position to tilt the backrest 31 to the front. Simultaneously, the controller 20 controls the lift mechanism 34 so that the angle θ_2 between the ottoman 32 and the seat 30 is decreased from 170 degrees at the sleep position to 150 degrees at the basic position to tilt the ottoman 32 toward the basic position.

[0048] After the predetermined time A elapses and until predetermined time B, the controller 20 controls the rocker drive device 12 to produce a rocking motion with an amplitude that is in accordance with the final motion described above, that is, so that the body support 13 is rocked at a frequency of 0.2 Hz, which is the lower limit value of the frequency in the present embodiment and continues the rocking so that the user enters a sleeping state from a relaxed state. At predetermined times A and B, the controller 20 produces the rocking motion while maintaining the state at the sleep position (reclining angle $\theta_1 = 170$ degrees, angle θ_2 between the ottoman 32 and the seat 30 = 170 degrees).

[Refreshment Rocking]

[0049] After predetermined time B elapses, the controller 20 controls the rocker drive device 12 so that the frequency of the rocking motion changes in a stepped manner from 0.2 Hz to 0.3 Hz, 0.3 Hz to 0.4 Hz, and then 0.4 Hz to 0.6 Hz to draw the user from a sleeping state (relaxed state) to an awakened state. In this state, the controller 20 controls the timing at which the frequency changes so that a change occurs after, for example, ten rocking motion reciprocations. Further, the controller 20

controls the rocker drive device 12 so that the amplitude increases in steps in synchronism at the timing at which the frequency changes.

[0050] Further, together with the refreshment rocking described above, the controller 20 repetitively tilts the backrest 31 and the ottoman 32 so that the body support 13 is moved between the basic position (refer to Fig. 2) and an upright position (refer to Fig. 3). In detail, at the same time as when the body support 13 moves back toward the rear as shown in Fig. 7, the controller 20 controls the reclining mechanism 33 so that the reclining angle θ_1 decreases from 150 degrees at the basic position to 120 degrees at the upright position to tilt the backrest 31 to the front and approach the upright position. Simultaneously, as shown in Fig. 7, the controller 20 controls the lift mechanism 34 so that the angle θ_2 between the ottoman 32 and the seat 30 is decreased from 160 degrees at the basic position to 130 degrees at the upright position to tilt the ottoman 32 toward the upright position. Then, at the same time as when the body support 13 moves forth toward the front, the controller 20 controls the reclining mechanism 33 so that the reclining angle θ_1 increases from 120 degrees at the upright position to 150 degrees at the basic position to tilt the backrest 31 to the rear. Simultaneously, the controller 20 controls the lift mechanism 34 so that the angle θ_2 between the ottoman 32 and the seat 30 is increased from 130 degrees at the upright position to 160 degrees at the basic position to tilt the ottoman 32 toward the basic position.

[0051] The characteristic advantages of the present embodiment will now be discussed.

(1) When the body support 13 is moving toward the front, the reclining mechanism 33, which serves as the position adjustment means, increases the angle between the backrest 31 and the seat 30 (reclining angle θ_1) from the basic position ($\theta_1 = 150$ degrees) toward the sleep position ($\theta_1 = 170$ degrees). In this state, the backrest 31 is tilted to the sleep position so that the user's body automatically moves to the sleep position and becomes straight. As a result, a floating feel is apt to being generated relatively around the waist. This generates a relaxation effect, which results from the relaxation operation of the prior art, and a floating feel for the user. That is, synergistic relaxation motions are generated, and a further effective relaxation effect is generated.

(2) When the body support 13 is moving toward the rear, the reclining mechanism 33, which serves as the position adjustment means, decreases the angle between the backrest 31 and the seat 30 (reclining angle θ_1) from the sleep position ($\theta_1 = 170$ degrees) toward the basic position ($\theta_1 = 150$ degrees). This allows for the backrest 31 to be repetitively tilted toward the sleep position during movement of the body support 13 toward the front and repetitively generates the effect described in advantage (1).

(3) The reclining mechanism 33, which serves as the position adjustment means, moves the backrest 31 relative to the seat 30. When the seat 30 is horizontal at the basic position, the movement of the backrest 31 relative to the seat 30 causes the sleep position to become horizontal. This disperses the force produced by the user's weight and received by each part of the body and generates a further effective relaxation effect. Further, if the backrest 31 is tilted (moved toward the rear) toward the sleep position when the body support 13 is being moved toward the front, the user's head does not move toward the front or rear. Thus, the semicircular canals, which are for keeping balance, do not move toward the front and rear. This reduces dizziness such as motion sickness.

(4) When the body support 13 is moving toward the front, the lift mechanism 34 increases the angle θ_2 between the ottoman 32 and the seat 30 from the basic position ($\theta_1 = 160$ degrees) toward the sleep position ($\theta_2 = 170$ degrees). This approaches the user's legs toward the sleep position so that the user is more apt to experiencing a floating feel and thereby generates a further effective refreshing effect.

(5) When the body support 13 is moving toward the rear, the lift mechanism 34 decreases the angle θ_2 between the ottoman 32 and the seat 30 from the sleep position ($\theta_2 = 170$ degrees) toward the basic position ($\theta_2 = 160$ degrees). This allows for the ottoman 32 to be repetitively tilted toward the sleep position when the body support 13 is moving toward the front and repetitively generates the effect described in advantage (4).

(6) When the body support 13 is moving toward the rear during the refreshing operation (after the predetermined time B elapses), the reclining mechanism 33 decreases the angle between the backrest 31 and the seat 30 (reclining angle θ_1) from the basic position ($\theta_1 = 150$ degrees) toward the upright position (120 degrees). That is, after the relaxation rocking, the angle (θ_1) between the backrest 31 and the seat 30 is decreased toward the upright position so that the user's body is held upright. This has a refreshing effect on the user.

(7) When the body support 13 is moving toward the front during the refreshing operation (after the predetermined time B elapses), the reclining mechanism 33 increases the angle (θ_1) between the backrest 31 and the seat 30 from the upright position (120 degrees) toward the basic position ($\theta_1 = 150$ degrees). This allows for the seat 30 and seat 30 to be repetitively tilted toward the upright position when the body support 13 is moving toward the rear and repetitively generates the effect described in advantage (6).

tage (6).

(8) The reclining mechanism 33 moves the backrest 31 relative to the seat 30 during the refreshing operation (after the predetermined time B elapses). When the seat 30 is horizontal at the basic position, the backrest 31 is moved relative to the seat 30 so that the upper body is held upright. In contrast, if the seat 30 were to be moved relative to the backrest 31 to the upright position, the seat 30 would approach a vertical side from a horizontal side. This would result in the user's own weight (particularly, the weight of the lower body) being applied to the waist. Thus, too much load would be applied to the user such that the user cannot be comfortably aroused (awakened). In the present embodiment, which moves the backrest 31 relative to the seat 30, the application of the user's own weight to the waist is suppressed. This allows for the user to be comfortably aroused (awakened) and generates a further effective refreshing effect.

(9) When the body support 13 is moving toward the rear during the refreshing operation (after the predetermined time B elapses), the reclining mechanism 33 decreases the angle θ_2 between the ottoman 32 and the seat 30 from the basic position ($\theta_2 = 160$ degrees) toward the upright position (130 degrees). This moves the user's legs (mainly, below the knees) to a vertically lower position so as to move the joints and the like of the user's body, stimulate motor sensation, and allow for the weight of the legs to be felt more easily so as to awaken the user.

(10) When the body support 13 is moving toward the front during the refreshing operation (after the predetermined time B elapses), the lift mechanism 34 increases the angle θ_2 between the seat 30 and the ottoman 32 from the upright position ($\theta_2 = 130$ degrees) toward the basic position ($\theta_2 = 160$ degrees). This repetitively tilts and moves the ottoman 32 toward the upright position when the body support 13 is moving toward the rear and repetitively generates the effect described in advantage (9).

(11) The lift mechanism 34, which serves as the position adjustment means, moves the ottoman 32 relative to the seat 30. For example, when the seat is horizontal at the basic position, the ottoman 32 is moved relative to the seat 30 so that the sleep position approaches a horizontal state. This disperses the force applied by the user's own weight to each part of the user's body and generates a further effective relaxation effect. In contrast, for example, if the seat 30 were to be moved relative to the ottoman 32 toward the sleep position, the seat 30 would be tilted relative to a horizontal plane (floor surface) from a horizontal state. As a result, the user's body would

be held upright, and an effective relaxation effect cannot be generated. Accordingly, the structure of the present invention, which moves the ottoman 32 relative to the seat 30, is effective. Further, during the refreshing operation, in a state in which the seat 30 is generally horizontal at the basic position, the user's own weight would be applied to the waist. Thus, too much load would be applied to the user such that the user cannot be comfortably aroused (awakened). In the present embodiment, which moves the backrest 31 relative to the seat 30, the application of the user's own weight to the waist is suppressed. This allows for the user to be comfortably aroused (awakened) and generates a further effective refreshing effect. Accordingly, the structure of the present invention, which moves the ottoman 32 relative to the seat 30, suppresses the user's own weight from being applied to the waist. This allows for the user to be comfortably aroused (awakened) and generates a further effective refreshing effect. Further, the seat 30 generally supports relatively heavy parts of the user's body, such as the buttocks and the thighs, and the ottoman 32 supports relatively light parts such as the legs. Thus, the ottoman 32 is easily moved relative to the seat 30. That is, the drive force for moving the ottoman 32 relative to the seat 30 may be decreased, and a smaller driving mechanism may be used. This consequently avoids enlargement of the relaxation apparatus.

(12) The reclining mechanism 33 and the lift mechanism 34, which serve as the position adjustment means, moves the body support 13 to each position when the body support 13 starts to move toward the front or the rear. This increases the cooperative feel of position shifts (tilting motion) and the rocking motion of the body support 13, and thereby allows for a further effective relaxation effect and refreshing effect to be generated.

[0052] The embodiment of the present invention may be modified as described below.

[0053] In the above-described embodiment, the basic position is $\theta_1 = 170$ degrees, $\theta_2 = 160$ degrees, the sleep position is $\theta_1 = 170$ degrees, $\theta_2 = 170$ degrees, and the upright position is $\theta_1 = 120$ degrees, $\theta_2 = 130$ degrees. However, the present invention is not limited in such a manner. For example, at the sleep position, the angle θ_1 and angle θ_2 formed with the seat 30 may be greater than at the basic position so that the backrest 31 and the ottoman 32 approaches a parallel state relative to the seat 30. Further, at the upright position, the angle θ_1 and angle θ_2 formed with the seat 30 may be greater than at the basic position so that the backrest 31 and the ottoman 32 approaches a perpendicular direction relative to the seat 30.

[0054] In the above-described embodiment, the backrest 31 and the ottoman 32 are tilted relative to the seat

30. However, the seat 30 may be tilted relative to at least one of the backrest 31 and the ottoman 32.

[0055] In the above-described embodiment, the ottoman 32 is tilted. However, the tilting of the ottoman 32 may be disabled. That is, as shown in Fig. 2, the ottoman 32 may be fixed at a predetermined angle, and only the backrest 31 may be tilted. Further, the ottoman 32 may be eliminated. In other words, the connected supporter may be only the backrest 31. In this case, the lift mechanism 34 may be eliminated, and only the reclining mechanism 33 functions as the position adjustment means.

[0056] In the above-described embodiment, the body support 13 is shifted to each position as (at the same time as when) the body support 13 starts to move toward the front or the rear. However, the position shifting does not have to be performed simultaneously in such a manner.

[0057] In the above-described embodiment, when the body support 13 is moving toward the front during the refreshing operation after the predetermined time B elapses (after the relaxation rocking), the lift mechanism 34 increases the angle θ_2 between the seat 30 and the ottoman 32 from the upright position ($\theta_2 = 130$ degrees) toward the basic position ($\theta_2 = 160$ degrees). However, the present invention is not limited in such a manner. For example, during the refreshment rocking (refreshing operation) after the predetermined time B elapses, the lift mechanism 34 does not have to move the ottoman 32 from the upright position to the basic position when the body support 13 is moving toward the front, and it is only required that the ottoman 32 be moved from the basic position to the upright position only at least when the body support 13 is moving toward the rear. In addition, the movement of the ottoman 32 from the basic position to the upright position may be eliminated when the body support 13 is moving toward the rear.

[0058] In the above-described embodiment, when the body support 13 is moving toward the front during the refreshment rocking after the predetermined time B elapses (after the relaxation rocking), the reclining mechanism 33 increases the angle (θ_1) between the backrest 31 and the seat 30 from the upright position (120 degrees) toward the basic position ($\theta_1 = 150$ degrees). However, the present invention is not limited in such a manner. For example, during the refreshment rocking (refreshing operation) after the predetermined time B elapses, the reclining mechanism 33 does not have to move the backrest 31 from the upright position to the basic position when the body support 13 is moving toward the front, and it is only required that the backrest 31 be moved from the basic position to the upright position only at least when the body support 13 is moving toward the rear. In addition, the movement of the backrest 31 from the basic position to the upright position may be eliminated when the body support 13 is moving toward the rear.

[0059] Although not particularly mentioned in the above-described embodiment, as shown in Fig.12, to rock the body support 13 toward the front and rear, the

rocker drive device 12 may include a plurality of rotatable joints 40, arms 41 connected to the joints 40, and actuators (not shown) for driving the joints 40. Instead of the afore-mentioned structure, the rocker drive device 12 may have any structure as long as the body support 13 can be rocked toward the front and rear.

[0060] Although not particularly mentioned in the above-described embodiment, for example, as shown in Fig. 9, in addition to the tilting motion of the backrest 31 by the reclining mechanism 33 (refer to Fig. 1), a direct drive mechanism 42 may be arranged in the backrest 31 to move a headrest 43 in a direction perpendicular to the longitudinal direction of the backrest 31 to move the user's body. Further, instead of the direct drive mechanism 42, as shown in Fig. 11, an airbag 44 may be inflated and deflated to move the user's body. As another option, medical treatment elements (not shown), which are often used in massage machines or the like may be used to move the user's body. As mentioned above, in addition to the tilting motion of the backrest 31 with the reclining mechanism 33, movement of the user's body with the other mechanisms 42 and 44 increases the movement variations so that the movement does not become monotonous. This contributes to maintaining the user's motivation when using the apparatus 10.

[0061] Further, as shown in Fig. 11(a), the movement change amount for the tilting motion of the backrest 31 by the reclining mechanism 33, which serves as a position adjustment means, and, for example, the inflation amount of the airbag 44 may be set so that the user's head becomes close to the vicinity of a rotation center X of the rocking motion. For example, as shown in Fig. 11 (b), in comparison to when the user's head is not moved to the vicinity of the rotation center X of the rocking motion, movement of the semicircular canals, which are for keeping balance, is suppressed. This reduces dizziness such as motion sickness and has an effective relaxation effect. When the airbag 44 is eliminated, the movement change amount for the tilting motion of the backrest 31 is adjustable, and such adjustment moves the user's head to the vicinity of the rotation center X of the rocking motion. Thus, the same advantages may be obtained.

[0062] Although not particularly mentioned in the above-described embodiment, the controller 20 may be configured to allow for separate setting of the rocking frequency for the rocking motion of the body support 13 by the rocker drive device 12 and the reciprocating frequency when shifting the positions of the backrest 31 (body support 13) with the reclining mechanism 33, which serves as the position adjustment means. Such a structure increases the variation in the motion patterns of the apparatus 10 and contributes to maintaining the user's motivation. Further, by increasing the reciprocating frequency for the tilting motion of the backrest 31 to be higher than the frequency of the rocking motion and increasing the inflation-deflation frequency of the airbag 44 or the like, the user's head (semicircular canals) are stimulated. Thus, a refreshing effect may be expected.

[0063] In the above-described embodiment, when the body support 13 is moving toward the rear during the relaxation rocking, the lift mechanism 34 decreases the angle θ_2 between the ottoman 32 and the seat 30 from the sleep position ($\theta_2 = 170$ degrees) toward the basic position ($\theta_2 = 160$ degrees). However, the present invention is not limited in such a manner. For example, during the relaxation rocking, the lift mechanism 34 does not have to move the ottoman 32 from the sleep position to the basic position when the body support 13 is moving toward the rear, and it is only required that the ottoman 32 be moved from the basic position to the sleep position when the body support 13 is moving toward the front.

[0064] In the above-described embodiment, during the relaxation rocking, the controller 20 controls the rocker drive device 12 so that the frequency for the rocking motion of the body support 13 shifts between 0.35 Hz to 0.2 Hz. However, the controller 20 may control the rocker drive device 12 in other frequency bands enabling relaxation.

[0065] In the above-described embodiment, during the refreshment rocking (refreshing operation), the controller 20 controls the rocker drive device 12 so that the frequency for the rocking motion of the body support 13 shifts between 0.2 Hz to 0.6 Hz. However, the controller 20 may control the rocker drive device 12 in other frequency bands enabling refreshment.

[0066] In the above-described embodiment, the parts controlled by the controller 20 at the predetermined time A and predetermined time B are switched. However, the present invention is not limited in such a manner. For example, switches allowing for the user to switch the parts controlled by the controller 20 may be used so that switching is performed at the user's desirable timing.

[0067] In the above-described embodiment, the refreshment rocking is performed after the relaxation rocking. However, only the relaxation rocking may be performed.

[0068] Although not particularly mentioned in the above-described embodiment, music or vibration corresponding to the relaxation rocking or refreshment rocking may be additionally generated.

Claims

1. A relaxation apparatus (10) including a body support means (13), a rocker drive means (12), and a control means (20), the body support means (31; 32) including a seat (30), on which a user can sit, and a connected supporter (31; 32), which is connected to the seat to support part of a user's body, the rocker drive means (12) being arranged to rock and move the body support means in front and rear directions, and the control means (20) being arranged to control the rocker drive means to perform relaxation rocking, the relaxation apparatus being characterized by:

a position adjustment means (33, 34) for shifting the body support means between a basic position, a sleep position, at which the angle between the seat and the connected supporter is greater than that at the basic position, and an upright position, at which the angle between the seat and the connected supporter is less than that at the basic position;

wherein the position adjustment means (33, 34) is arranged to change the angle of the connected supporter relative to the seat when the body support means is moving to at least either one of the front and the rear in order to move the body support means from the basic position to the sleep position or the upright position.

2. The relaxation apparatus (10) according to claim 1, being **characterized in that:**

the connected supporter includes a backrest (31) tiltably fixed to the rear of the seat (30); and the position adjustment means (33) is arranged to increase the angle between the backrest and the seat when the body support means (13) is moving toward the front in order to move the body support means from the basic position to the sleep position.

3. The relaxation apparatus (10) according to claim 2, being **characterized in that:**

the position adjustment means (33) is arranged to decrease the angle between the backrest and the seat when the body support means (13) is moving toward the rear in order to move the body support means from the sleep position to the basic position.

4. The relaxation apparatus (10) according to claim 2 or 3, being **characterized in that:**

the connected supporter includes an ottoman (32) fixed in a relatively tiltable manner to the front of the seat (30); and the position adjustment means (33, 34) is arranged to increase the angle between the ottoman and the seat when the body support means (13) is moving toward the front in order to move the body support means from the basic position to the sleep position.

5. The relaxation apparatus (10) according to claim 4, being **characterized in that:**

the position adjustment means (33, 34) is arranged to decrease the angle between the ottoman and the seat when the body support means

(13) is moving toward the rear in order to move the body support means from the sleep position to the basic position.

6. The relaxation apparatus (10) according to claim 5, being **characterized in that:**

in order to refresh the user who is in a relaxed state, the position adjustment means (33, 34) is arranged to decrease the angle between the backrest (31) and the seat (30) when the body support means (13) is moving toward the rear in order to move the body support means from the basic position to the upright position.

7. The relaxation apparatus (10) according to claim 6, being **characterized in that:**

the position adjustment means (33, 34) is arranged to increase the angle between the backrest (31) and the seat (30) when the body support means (13) is moving toward the front during the refreshing in order to move the body support means from the upright position to the basic position.

8. The relaxation apparatus (10) according to claim 6 or 7, being **characterized in that:**

the position adjustment means (33, 34) is arranged to decrease the angle between the ottoman (32) and the seat (30) when the body support means (13) is moving toward the rear during the refreshing in order to move the body support means from the basic position to the upright position.

9. The relaxation apparatus (10) according to claim 8, being **characterized in that:**

the position adjustment means (33, 34) is arranged to increase the angle between the seat (30) and the ottoman (32) when the body support means (13) is moving toward the front during the refreshing in order to move the body support means from the upright position to the basic position.

10. The relaxation apparatus (10) according to claim 9, being **characterized in that** the position adjustment means (33, 34) is arranged to move the backrest (31) relative to the seat.

11. The relaxation apparatus (10) according to claim 9, being **characterized in that** the position adjustment means (33, 34) is arranged to move the ottoman (32) relative to the seat.

12. The relaxation apparatus (10) according to claim 11, being **characterized in that** the position adjustment means (33, 34) is arranged to shift the body support means (13) to each position when the body support means starts to move toward the front or the rear. 5
13. The relaxation apparatus (10) according to claim 11, being **characterized in that** the position adjustment means (33, 34) is configured so that a movement change amount is adjustable for moving the connected supporter (31; 32) to each position. 10
14. The relaxation apparatus (10) according to claim 11, being **characterized in that** a reciprocating frequency for when the position adjustment means (33; 34) shifts the body support means (13) to each position and a rocking frequency for the body support means generated by the rocker drive means (12) are separately settable. 15

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Fig.1

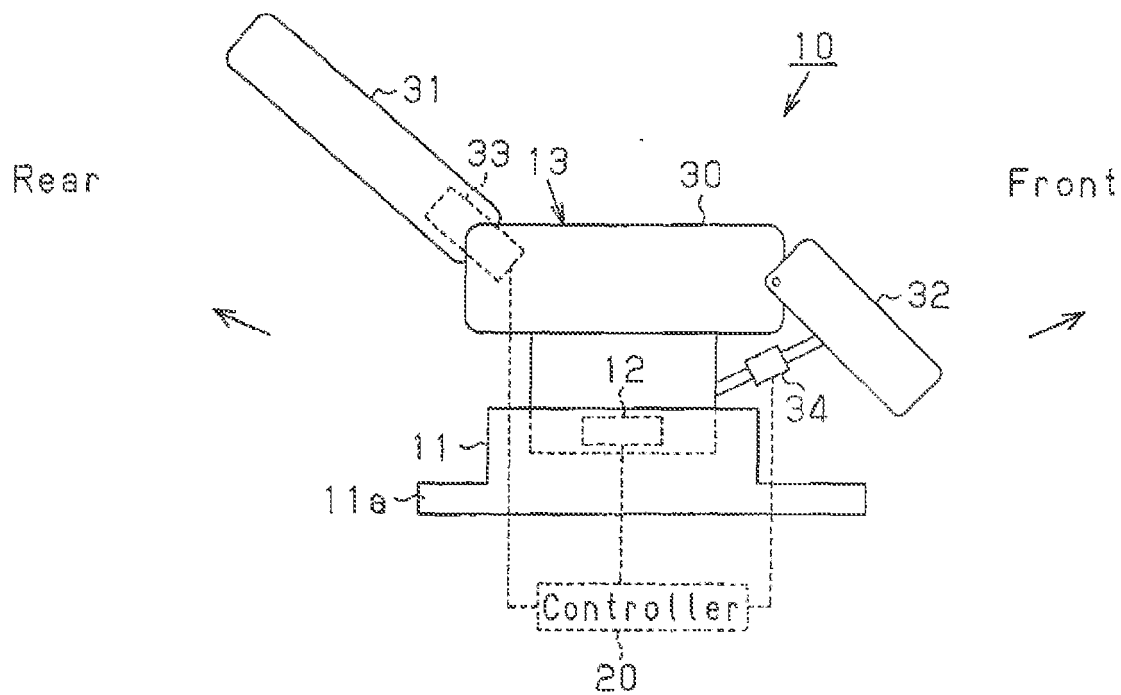


Fig.2

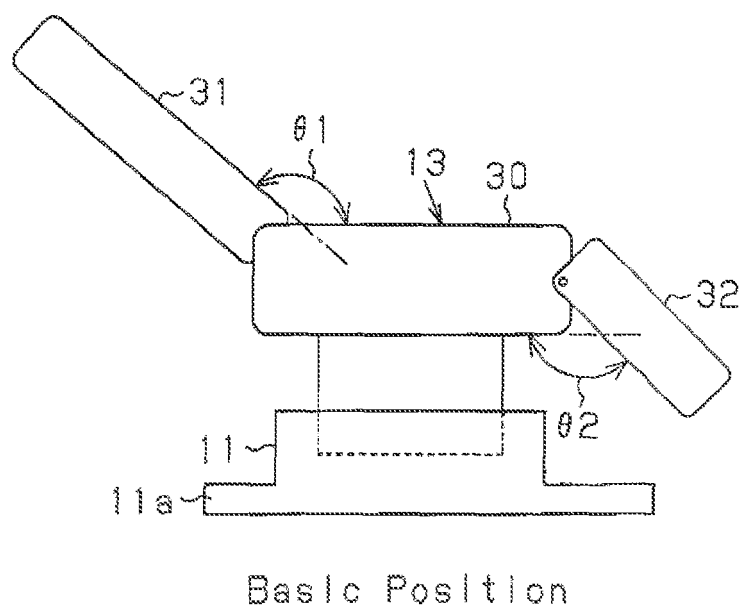


Fig.3

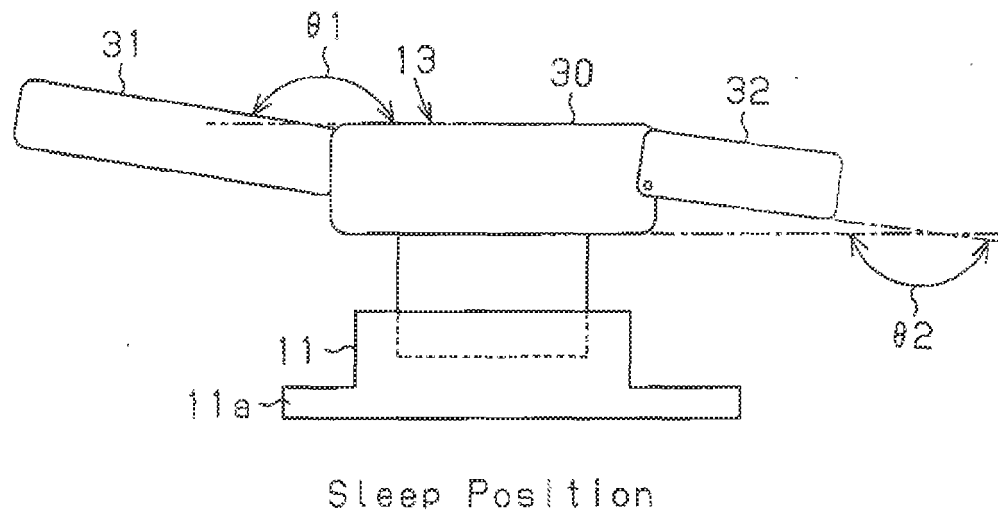


Fig.4

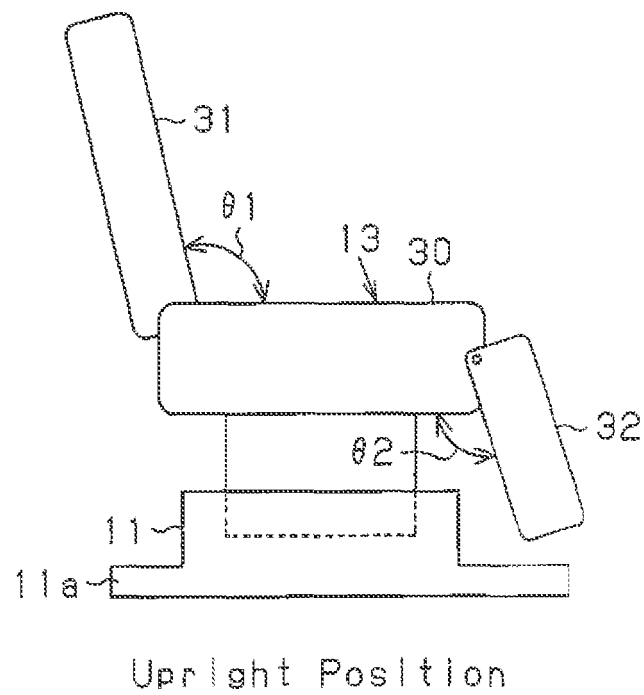


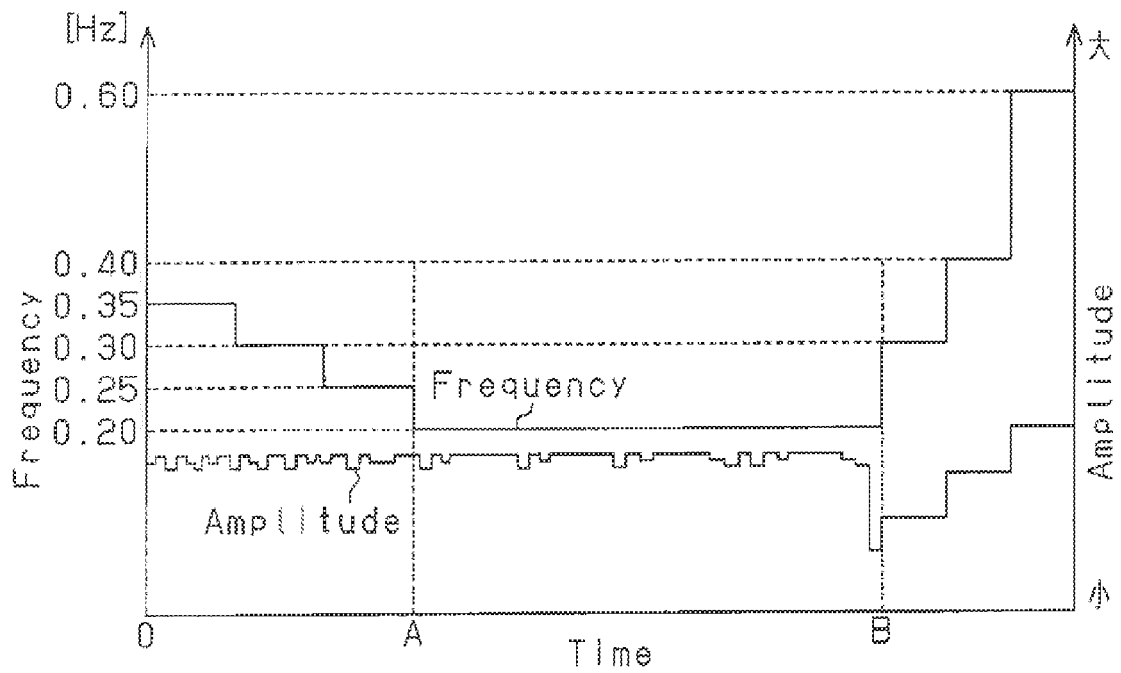
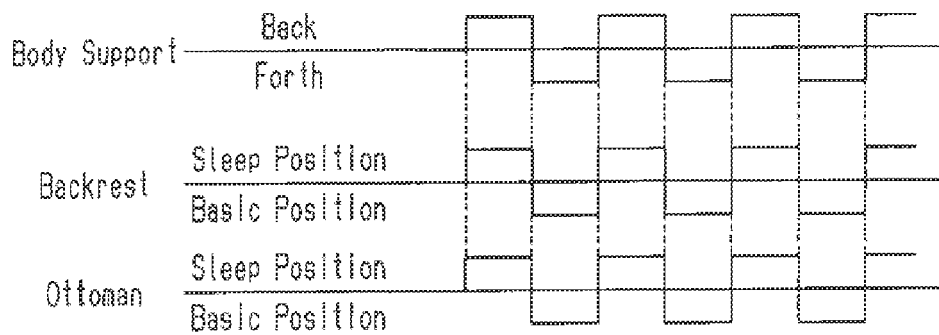
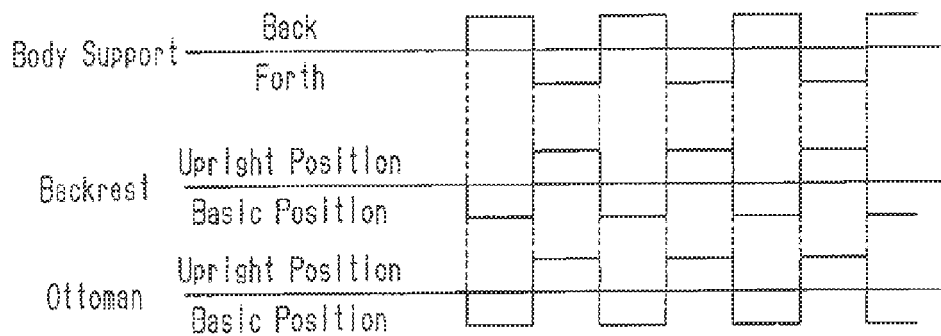
Fig.5**Fig.6****Fig.7**

Fig.8

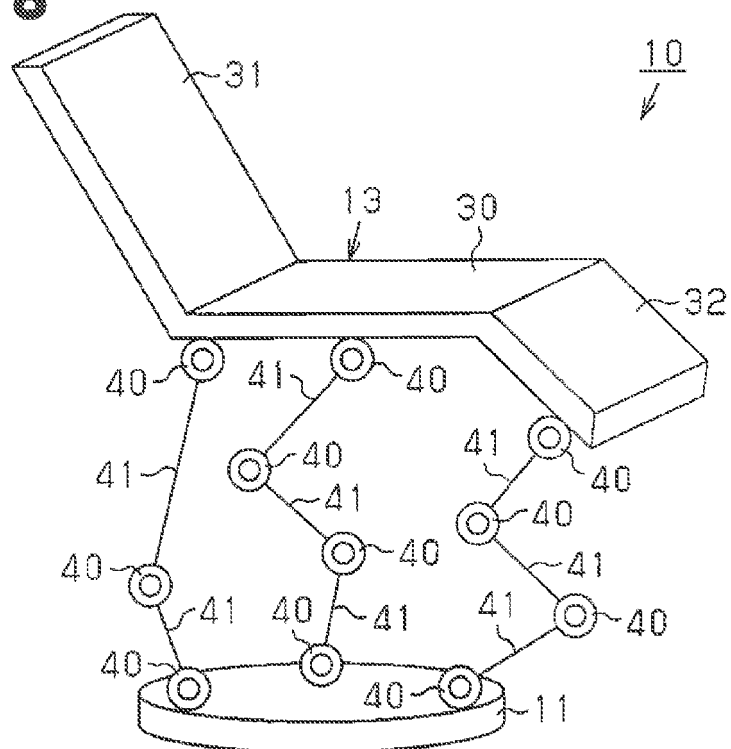


Fig.9

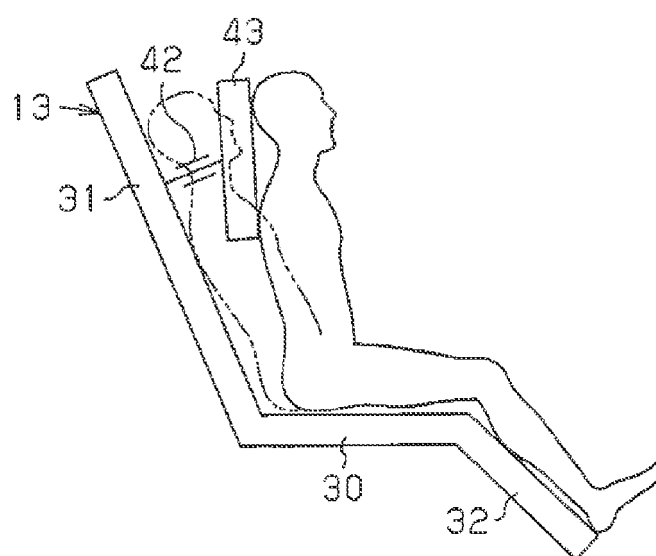


Fig.10

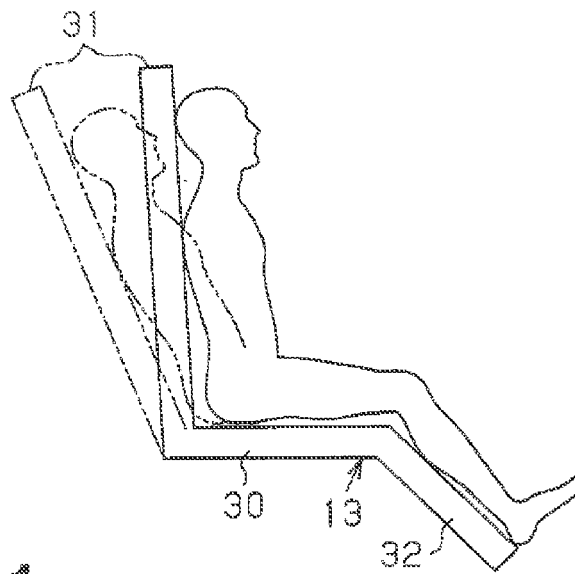
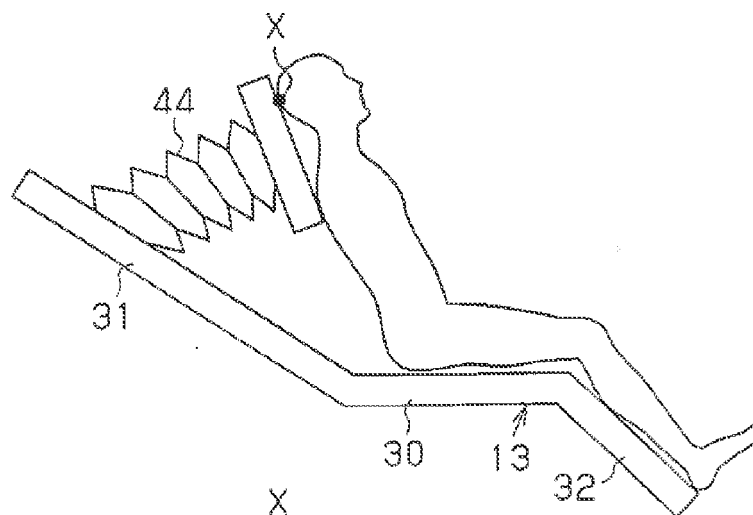
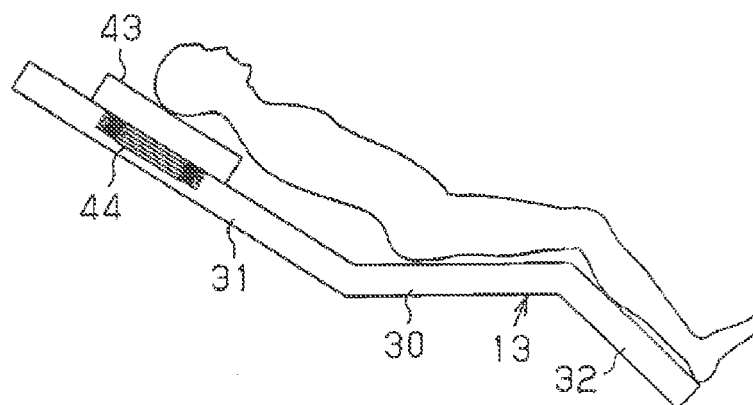


Fig.11

(a)



(b)





EUROPEAN SEARCH REPORT

Application Number
EP 09 17 1284

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 494 850 B1 (KITADOU MASAKO [JP] ET AL) 17 December 2002 (2002-12-17) * column 9, line 24 - column 12, line 15 * * figures * -----	1-14	INV. A47C3/02
X	US 6 056 363 A (MADDOX LEE W [US]) 2 May 2000 (2000-05-02) * column 2, line 20 - column 3, line 35 * * figures * -----	1	
A	US 6 237 994 B1 (BENTLEY PAUL [US] ET AL) 29 May 2001 (2001-05-29) * abstract; figures * -----	1-14	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			A47C
Place of search		Date of completion of the search	Examiner
Munich		10 December 2009	MacCormick, Duncan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EP 09 17 1284

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10-12-2009

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