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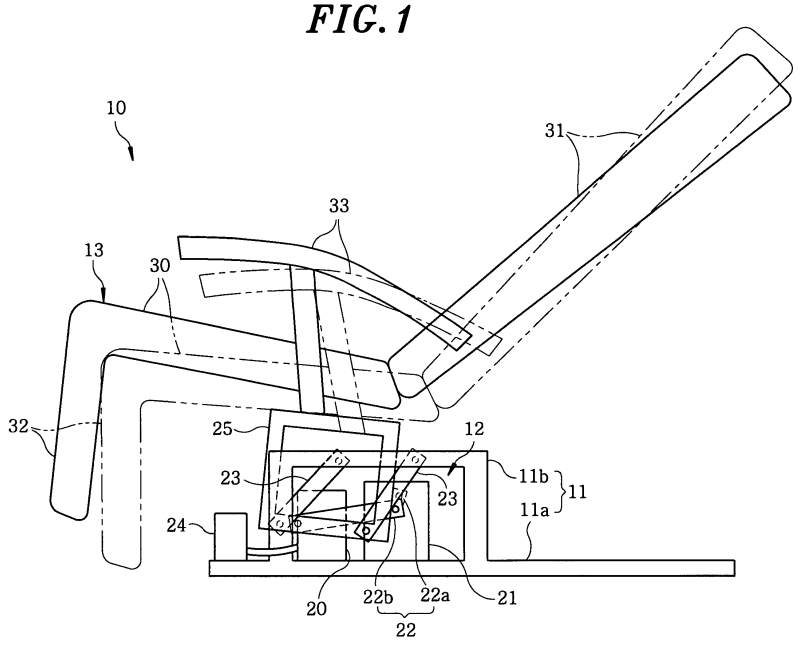
(54) Relaxation apparatus

(57) A relaxation apparatus includes a body-supporting unit for supporting a user's body, a rocking unit for rocking back and forth the body-supporting unit and a controller for controlling the rocking unit to rock the body-supporting unit. The body-supporting unit includes an air-bag which is inflated to press the user's body or contracted in accordance with suppy or exhaust of air by an air pump. The controller controls the air pump to synchronize the inflation or contraction of the air bag with at least one of forward and backward motions of the body-supporting unit.

FIG. 1



EP 2 151 224 A1

Description

Field of the Invention

[0001] The present invention relates to an apparatus for providing a user with a relaxing effect.

Background of the Invention

[0002] A conventional relaxation apparatus, which provides a user seating on a chair-shaped body-supporting member with relaxing effect by rocking the user's body, is described in Japanese Patent Laid-open Publication No. 2003-250851 (hereinafter, referred to as the cited reference).

[0003] The relaxation apparatus in the cited reference has a rocking unit (i.e., the relaxation mechanism in the cited reference) which rocks a body-supporting member (i.e., the main body of the seating unit in the cited reference) back and forth and hence provides a user with a relaxing effect by the rocking motion. This relaxation apparatus also has air bags in the left and right portions of the body-supporting member. The air bags, driven by an air pump, inflate and contract alternatively so that it is possible to roll a user to his/her left and right like a hammock or cradle, which can also provide its user with a relaxation effect.

[0004] In the above-mentioned relaxation apparatus, however, the inflation and contraction by the air pump take place independently of the rocking motion of the body-supporting member. Sometimes they give a feeling of insufficient movement due to the mutual cancellation effect of relaxation motions associated with them, resulting in ineffective relaxation effects.

Summary of the Invention

[0005] In view of the above, the present invention provides a relaxation apparatus capable of giving an effective relaxation effect to a user by using the rocking motion of the user's body and the inflation and contraction of air bags.

[0006] In accordance with an aspect of the present invention, there is provided a relaxation apparatus including a body-supporting unit for supporting a user's body, a rocking unit for rocking back and forth the body-supporting unit and a controller for controlling the rocking unit to rock the body-supporting unit, **characterized in that**: the body-supporting unit includes an airbag which is inflated to press the user's body or contracted in accordance with suppy or exhaust of air by an air pump, and the controller controls the air pump to synchronize the inflation or contraction of the air bag with at least one of forward and backward motions of the body-supporting unit.

[0007] The controller may control the air pump to start the inflation of the air bag during the forward motion of the body-supporting unit.

[0008] The controller may control the air pump to start the contraction of the air bag during the backward motion of the body-supporting unit.

[0009] The controller may control the air pump to inflate the air bag at the time when the body-supporting unit begins to move forward and/or contract the air bag at the time when the body-supporting unit begins to move backward.

[0010] The controller may control the air pump to suspend the body-supporting unit during a predetermined period of time while the rocking motion of the body-supporting unit changes its direction and to begin to inflate or contract the air bag during the suspension period.

[0011] The controller may control the rocking unit to impose fluctuations upon frequency and/or amplitude of the rocking motion and may control the air pump to have the air bag begin to inflate or contract in synchronization with the frequency and/or amplitude upon which the fluctuations are imposed.

[0012] The controller may control the rocking unit to impose fluctuations upon frequency and/or amplitude of the rocking motion and may control the air pump to supply the air to the air bag in synchronization with the frequency and/or amplitude upon which the fluctuations are imposed.

[0013] The controller may control the rocking unit and the air pump to perform, on a user in a relaxed state, a refresh rocking in which frequency and/or amplitude of the rocking motion is increased to refresh the user in the relaxed state and the air bag begins to be inflated during the backward motion of the body-supporting unit.

[0014] The controller may control the rocking unit and the air pump to perform on a user in a relaxed state a refresh rocking in which frequency and/or amplitude of the rocking motion is increased to refresh the user in the relaxed state, and the air bag begins to be contracted during the forward motion of the body-supporting unit.

[0015] In the refersh-roking, the controller may control the air pump to inflate the air bag at the time when the body-supporting unit begins to move backward and/or contract the air bag at the time when the body-supporting unit begins to move forward.

[0016] In accordance with the present invention, the relaxation apparatus is capable of giving an effective relaxation effect to a user by using the rocking motion of the user's body and the inflation and contraction of the air bag.

Brief Description of the Drawings

[0017]

Fig. 1 shows a schematic configuration of a relaxation apparatus in accordance with an embodiment of the present invention.

Fig. 2 illustrates a perspective view of a body-supporting member of the relaxation apparatus in Fig. 1.

Fig. 3 depicts a graph for explaining frequency and

amplitude of a rocking motion of the body-supporting member.

Fig. 4 illustrates a graph showing the relationship between the motions of the body-supporting member and operations of airbags.

Fig. 5 is a graph showing the relationship between the motions of the body-supporting member and the operation of the airbags.

Fig. 6 depicts a graph showing the relationship between the motions of the body-supporting member and the operation of the airbags in accordance with another embodiment of the present invention.

Detailed Description of the Embodiments

[0018] Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0019] Fig. 1 shows a schematic configuration of a relaxation apparatus in accordance with an embodiment of the present invention. The relaxation apparatus 10 includes a base 11 having a bottom portion 11a placed on a floor (not shown), a rocking mechanism 12 as a rocking unit provided to the base 11 and a body-supporting member 13 as a body-supporting unit driven by the rocking mechanism 12.

[0020] The rocking mechanism 12 has a motor 20, a reduction gear 21, a crank mechanism 22 and a plurality of, e.g., two, link members 23. The motor 20 is provided on the bottom portion 11a of the base 11. The operation of the motor 20 is controlled by a controller 24 provided on the bottom portion 11a of the base 11. The reduction gear 21 is provided on the bottom portion 11a of the base 11. The reduction gear 21 is operationally coupled with the motor 20 and serves to reduce the power of the motor 20.

[0021] The crank mechanism 22 has two connecting rods 22a and 22b, and converts the rotating motion of the reduction gear 21 into a large circular motion. The base end of the connecting rod 22a is connected to and rotates with an output shaft of the reduction gear 21, while its leading end is ratatably connected to the base end of the connecting rod 22b. The leading end of the connecting rod 22b is connected to the lower portion of a rectangular frame 25 to which the body-supporting member 13 is fixed.

[0022] The base 11 also has a support frame 11b protruded upward from the bottom portion 11a. The base ends of the linkages 23 are rotatably connected to the upper portion of the support frame 11b at an interval, while their leading ends 22b are rotatably connected to the lower portion of the rectangular frame 25. The linkages 23 rotate around their base ends and, therefore, the body-supporting member 13, fixed to the rectangular frame 25, can be rocked back and forth by the power delivered from the crank mechanism 22, like a rocking chair. In the present embodiment of the invention, the movement path of the body-supporting member 13 from the rear to the front is referred to as a forward path and that from the front to the rear is referred to as a backward path.

[0023] The body-supporting member 13 of a chair shape includes a seat portion 30 which is fixed to an upper portion of the rectangular frame 25 so that they can move together, a back portion attached to the rear side of the seat portion 30 so that it can recline about the rear of the seat portion 30, an ottoman fixed at the front side of the seat portion 30 and two arm rests 33 fixed at both sides of the seat portion 30.

[0024] The back portion 31 can be reclined suitably by a reclining mechanism 34, which is controlled by the controller 24 as shown in Fig. 2.

[0025] In the upper part of the back portion 31, a pair of air bags 40 and 41 is provided corresponding respectively to the left and right shoulders of a user. In the middle of the back portion 31, three air bags 42, 43 and 44 are arranged vertically corresponding to the back of a user. In the lower part of the back portion 31, two air bags 45 and 46 corresponding respectively to the left and right sides of the waist of a user. Two air bags 47 and 48 are provided at the left and right sides in the seat portion 30 corresponding to the hip and thigh of a user. The air bags 40 to 48 provided corresponding to respective body parts of a user, are installed to be activated by an air pump 49 provided under the seat portion 30 via connecting hoses (not shown). The operation of the air pump 49 is controlled by the controller 24 so that the air bags 40 to 48 can be inflated and contracted.

[0026] Hereinafter, the operation of the relaxation apparatus 10 configured as described above will be described with reference to Figs. 1 to 5.

[0027] In the controller 24, several modes are provided including a single mode in which a relaxation rocking of the body-supporting member 13 is carried out by driving the rocking mechanism 12 and a combination mode in which the relaxation rocking is carried out in combination with operation of the respective air bags 40 to 48 and reclining of the back portion 31. Among them, in a relaxation-rocking mode having a refresh effect, a "relaxation rocking" is initiated to give a relaxation effect to a user for a predetermined period of time, after which the operation mode is switched from the "relaxation rocking" to "refresh rocking" until the operation mode ends. Fig. 3 shows the variations of amplitude and frequency with time of the motion of the body-supporting member 13 driven by the rocking mechanism 12 in the relaxation-rocking mode.

(Relaxation rocking)

[0028] At first, the controller 24 controls the reclining mechanism 34 to recline the back portion 31 by a specified degree (for example, $\Delta\theta = 30°$) from a normal state (for example, at $\theta = 120°$) to a reclined state (for example, at $\theta = 150°$), where 8 denotes the angle the back portion 31 makes with the seat portion 30. During the reclining,

the speed at which the back 31 is reclined is controlled to have a gradual decrease. In order to lead a user to be from an awakened state to a relaxed state, the controller 24 controls the motor 20 to decrease the frequency of rocking of the body-supporting member 13 gradually, for example, from its initial value 0.35 Hz to the final 0.2 Hz in a piecewise manner by a decrement of 0.05 Hz until a predetermined time denoted by A in Fig. 3. At the same time, the motor is controlled to introduce fluctuations to the amplitude of the rocking motion.

[0029] As shown in Figs. 2 and 4, for example, at the time when the body-supporting member 13 moves forward along the forward path, the controller 24 drives the air pump 49 to inflate the air bags 45 and 46 at the waist position which move in the same direction as the user's body, among the air bags 40 to 48 provided in the back portion 31 and the seat portion 30 of the body-supporting member 13. Because the direction of inflation of the air bags 45 and 46 coincides with that of the rocking motion of the body-supporting member 13, the user may have an improved feeling of the relaxation movement like an increase of floating of his/her body, yielding a more effective relaxation effect.

[0030] On the other hand, at the time when the body-supporting member 13 moves backward along the backward path, for example, the controller 24 drives the air pump 49 to stop operation so that the air bags 45 and 46 at the waist position are contracted. Because the direction of contraction of the air bags 45 and 46 coincides with that of the rocking motion of the body-supporting member 13, the user may have an improved feeling of the relaxation movement, yielding a more effective relaxation effect.

[0031] Until a predetermined time B after the time A has lapsed, the controller 24 controls the motor 20 to generate fluctuations in the amplitude of the body-supporting member 13 at the minimum value of the frequency, 0.2 Hz in the present embodiment, and to continue the rocking motion in order to let the user rest in sleep in the relaxation state. During the time interval between A and B, the controller 24 suspends the operation of the air pump 49 and the air bags 40 to 48 as well.

(Refresh rocking)

[0032] After the lapse of time B, the controller 24 controls the motor 24 to increase the frequency of the rocking motion in a piecewise manner, for example, from 0.2 Hz to 0.3 Hz, 0.4 Hz and 0.6 Hz, in order to induce a user in the sleep (or relaxation) state to an awakened state. At this time, the controller 24 controls the frequency change timings, for example, such that the frequency changes every ten round trips the rocking motion of the body-supporting member 13 makes. Further, the controller 24 controls the motor 20 such that the amplitude increases stepwise in synchronization with the frequency change timings.

[0033] During the refresh rocking, as shown in Figs. 2 and 5, the controller 24 drives the air pump 49 at rest to inflate the air bags 45 and 46 at the waist position of the back portion 31 while the body-supporting member 13 moves backward along the backward path. With such operations of the body-supporting member 13 and the air bags 45 and 46, a user can have an improved feeling of the motion, yielding a more effective refresh effect like being awakened.

[0034] Further, as shown in Figs. 2 and 5, the controller 24 stops the air pump 49 to allow the inflated air bags 45 and 46 at the waist position to be contracted while the body-supporting member 13 moves forward along the forward path. With such operations of the body-supporting member 13 and the air bags 45 and 46, a user can have an improved feeling of the motion, yielding a more effective refresh effect like being awakened.

[0035] After the afore-mentioned operation of the air bags 45 and 46 is completed, the controller 24 controls the air pump 49 to supply air to the air bags 42 to 44 to lift the back of a user, leading to stretching his/her back.

[0036] Next, the characteristic effects of the present embodiments will be described.

(1) The body-supporting member 13 includes the air bags 40 to 48 that inflate to press a user or contract by supply or exhaust of the air with the air pump 49. The controller 24 controls the air pump 49 to synchronize the inflation or contraction of the air bags 45 and 46 with at least one of the forward and backward motions of the body-supporting member 13. Therefore, it becomes possible to synergically drive a relaxation motion to a user's body by combining the inflation and contraction motions of the air bags 45 and 46 with the rocking motion of the body-supporting member 13, yielding an effective relaxation effect.

(2) The controller 24 controls the air pump 49 to begin inflation of the air bags 45 and 46 during forward motion of the body-supporting member 13 in relaxation rocking. Since the direction of the inflation motion of the air bags 45 and 46 coincides with that of the rocking motion of the body-supporting member 13, a user may have an improved feeling of the relaxation movement like an increase of floating of his/her body, yielding a more effective relaxation effect.

(3) The controller 24 controls the air pump 49 to begin contraction of the air bags 45 and 46 during backward motion of the body-supporting member 13 in relaxation rocking. Since the direction of the contraction motion of the air bags 45 and 46 coincides with that of the rocking motion of the body-supporting member 13, a user may have an improved feeling of the relaxation movement, yielding a more effective relaxation effect.

(4) The controller 24 controls the air pump 49 such that the air bags 45 and 46 inflate at the time when the body-supporting member 13 changes its motion

to the forward direction and contract at the time when the body-supporting member 13 changes its motion to the backward direction. Since it becomes possible to synchronize the relaxation motions given to a user's body by the air bags 45 and 46 and the body-supporting member 13, allowing simultaneous relaxation motions of the air bags 45 and 46 and the body-supporting member 13, a user may have an increased feeling of the relaxation movement and, therefore, a more effective relaxation effect.

(5) The controller 24 controls the rocking mechanism 12 to carry out the refresh rocking that increases both the frequency and amplitude of the rocking motion after the relaxation rocking, thereby refreshing a user in a relaxation state. In addition, the controller 24 controls the air pump 49 to begin inflation of the air bags 45 and 46 during the backward motion of the body-supporting member 13. Accordingly, in the refresh rocking, it is possible to improve a feeling of the refresh motion by making the moving direction of the body-supporting member 13 (the rocking motion) opposite to the inflation direction of the air bags 45 and 46, so that a user in a relaxation state can effectively obtain a refresh effect like being awakened from a relaxed state.

(6) In the refresh rocking, the controller 24 controls the air pump 49 to begin contraction of the air bags 45 and 46 during the forward motion of the body-supporting member 13. Accordignlay, in the refresh rocking, it is possible to improve a feeling of the refresh motion by making the moving direction of the body-supporting member 13 (the rocking motion) opposite to the contraction direction of the air bags 45 and 46, so that a user in a relaxation state can effectively obtain a refresh effect like being awakened from a relaxed state.

(7) The controller 24 controls the air pump 49 such that the air bags 45 and 46 inflate at the time when the body-supporting member 13 changes its motion to the backward direction and contract at the time when the body-supporting member 13 changes its motion to the forward direction. Accordingly, in the refresh rocking, it is possible to synchronize the refresh motions given to a user's body by the air bags 45 and 46 and the body-supporting member 13, which improves a feeling of the refresh motion and increases the refresh motion given to the user at a time. As a result, the user can obtain a more effective refresh effect.

[0037] The embodiments of the present invention may be modified as described below.

[0038] Although the relaxation rocking is followed by a refresh rocking in the aforementioned embodiment, the relaxation rocking may be carried out alone without the refresh rocking.

[0039] In the embodiment described above, the controller 24 controls such that the inception of the forward and backward motions of the body-supporting member 13 is synchronized with that of inflation and contraction of the air bags 45 and 46. However, the present invention is not limited to the above. The inception of the forward and backward motions of the body-supporting member 13 may be carried out in synchronization with inflation of at least one of the air bags 40 to 44, 47 and 48 other than the air bags 45 and 46.

[0040] In the above, the air bags 45 and 46 begin inflation and contraction in synchronization with the inception of the change in the direction of the motion, the forward and backward motions (on the forward and backward paths, respectively), of the body-supporting member 13. However, the air bags 45 and 46 may be inflated or contracted, instead, during the course of the forward or backward motion of the body-supporting member 13.

[0041] As illustrated in Fig. 6, the body-supporting member 13 may be put to rest for a predetermined duration of time (for example, 1 second) between two adjacent motions in opposite directions and the controller may control, during the period of rest, the air pump 49 to begin inflation or contraction of the air bags 45 and 46 for the waist (see Fig. 2). In this modified configuration, the rocking motion begins by a pressing by the air bags 45 and 46 and it is possible to realize a feeling of riding a swing that begins to move by being pushed, which yields a more effective relaxation effect.

[0042] In the embodiment described above, during the relaxation rocking, the air bags 45 and 46 inflate and contract in synchronization with the rocking motions in both directions, forward on the forward path and backward on the backward path. However, the synchronization of inflation and contraction of the air bags may be performed only with either of the forward and backward motions of the body-supporting member 13.

[0043] In the embodiment described above, during the refresh rocking, the air bags 45 and 46 inflate and contract in synchronization with the rocking motions in both directions, forward on the forward path and backward on the backward path. However, the synchronization of inflation and contraction of the air bags may be performed only with either of the forward and backward motions of the body-supporting member 13.

[0044] In the embodiment described above, fluctuations are imposed only on the amplitude of the relaxation rocking motion. In a modified embodiment, fluctuations may be imposed on the frequency instead or on both the amplitude and frequency.

[0045] Further, the air bags 45 and 46 may be inflated or contracted in accordance with the amplitude and frequency on which fluctuations are imposed. With this modified configuration, the relaxation effect can be increased by introducing fluctuations to either or both of the frequency and amplitude of the rocking motion. Further, the air bags are inflated or contracted in synchronization with the changes in fluctuations, so that a user can obtain an increased feeling of motion and, therefore, a more effective relaxation effect.

[0046] The duration of air supply to the air bags 45 and 46 from the air pump 49 may be changed in accordance with the amplitude and frequency on which fluctuations are imposed. With this modified configuration, the air is supplied to the air bags 45 and 46 in synchronization with the fluctuation, so that the rocking motion and the operation of the air bags are carried out in combination. Accordingly, a user can obtain an increased feeling of motion and, therefore, a more effective relaxation effect.

[0047] In the embodiment described above, during the relaxation rocking, the controller 24 controls the motor 20 to change the frequency of the rocking motion of the body-supporting member 13 (the rectangular frame 25) in a range from 0.35 Hz to 0.2 Hz. However, controller 24 may control the motor 20 to change the frequency of the rocking motion of the body-supporting member 13 in other frequency bands for the relaxation rocking motion.

[0048] In the embodiment described above, during the refresh rocking, the controller 24 controls the motor 20 to change the frequency of the rocking motion of the body-supporting member 13 (the rectangular frame 25) from 0.2 Hz to 0.6 Hz stepwise. However, other frequency bands for the refresh rocking motion may be used.

[0049] In the embodiment described above, after the elapse of time B, the controller 24 controls the motor 20 to increase the amplitude and frequency of the rocking motion in synchronization with each other. In a modified configuration, however, such synchronization is not necessary. In addition, either of the amplitude and frequency may be made to increase.

[0050] In the embodiment described above, the controller 24 makes changes in control over the respective parts at times A and B. In a modified configuration, for example, there may be provided a switch capable of changing the control of the respective parts by the controller 24 so that a user can selectively control the respective parts by using the switch as needed.

[0051] Although the body-supporting member 13 has the shape of a chair in the embodiment described above, it may have other shapes, for example, a bed.

[0052] In the embodiment described in the above, even though it is not mentioned explicitly, there may be provided a mechanism for generating music or vibration corresponding to the relaxation rocking or refresh rocking.

[0053] While the invention has been shown and described with respect to the embodiments, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the scope of the invention as defined in the following claims.

Claims

1. A relaxation apparatus comprising a body-supporting unit for supporting a user's body, a rocking unit for rocking back and forth the body-supporting unit and a controller for controlling the rocking unit to rock the body-supporting unit, **characterized in that:**

   the body-supporting unit includes an airbag which is inflated to press the user's body or contracted in accordance with suppy or exhaust of air by an air pump, and
   the controller controls the air pump to synchronize the inflation or contraction of the air bag with at least one of forward and backward motions of the body-supporting unit.

2. The relaxation apparatus of claim 1, wherein the controller controls the air pump to start the inflation of the air bag during the forward motion of the body-supporting unit.

3. The relaxation apparatus of claim 1 or 2, wherein the controller controls the air pump to start the contraction of the air bag during the backward motion of the body-supporting unit.

4. The relaxation apparatus of any one of claims 1 to 3, wherein the controller controls the air pump to inflate the air bag at the time when the body-supporting unit begins to move forward and/or contract the air bag at the time when the body-supporting unit begins to move backward.

5. The relaxation apparatus of any one of claims 1 to 3, wherein the controller controls the air pump to suspend the body-supporting unit during a predetermined period of time while the rocking motion of the body-supporting unit changes its direction and to begin to inflate or contract the air bag during the suspension period.

6. The relaxation apparatus of any one of claims 1 to 5, wherein the controller controls the rocking unit to impose fluctuations upon frequency and/or amplitude of the rocking motion and controls the air pump to have the air bag begin to inflate or contract in synchronization with the frequency and/or amplitude upon which the fluctuations are imposed.

7. The relaxation apparatus of any one of claims 1 to 5, wherein the controller controls the rocking unit to impose fluctuations upon frequency and/or amplitude of the rocking motion and controls the air pump to supply the air to the air bag in synchronization with the frequency and/or amplitude upon which the fluctuations are imposed.

8. The relaxation apparatus of any one of claims 1 to 5, wherein the controller controls the rocking unit and the air pump to perform, on a user in a relaxed state, a refresh rocking in which frequency and/or amplitude of the rocking motion is increased to refresh the user in the relaxed state and the air bag begins to

be inflated during the backward motion of the body-supporting unit.

9. The relaxation apparatus of any one of claims 1 to 5, wherein the controller controls the rocking unit and the air pump to perform on a user in a relaxed state a refresh rocking mode in which frequency and/or amplitude of the rocking motion is increased to refresh the user in the relaxed state, and the air bag begins to be contracted during the forward motion of the body-supporting unit.

10. The relaxation apparatus of claim 8 or 9, wherein, in the refresh rocking, the controller controls the air pump to inflate the air bag at the time when the body-supporting unit begins to move backward and/or contract the air bag at the time when the body-supporting unit begins to move forward.

FIG. 1

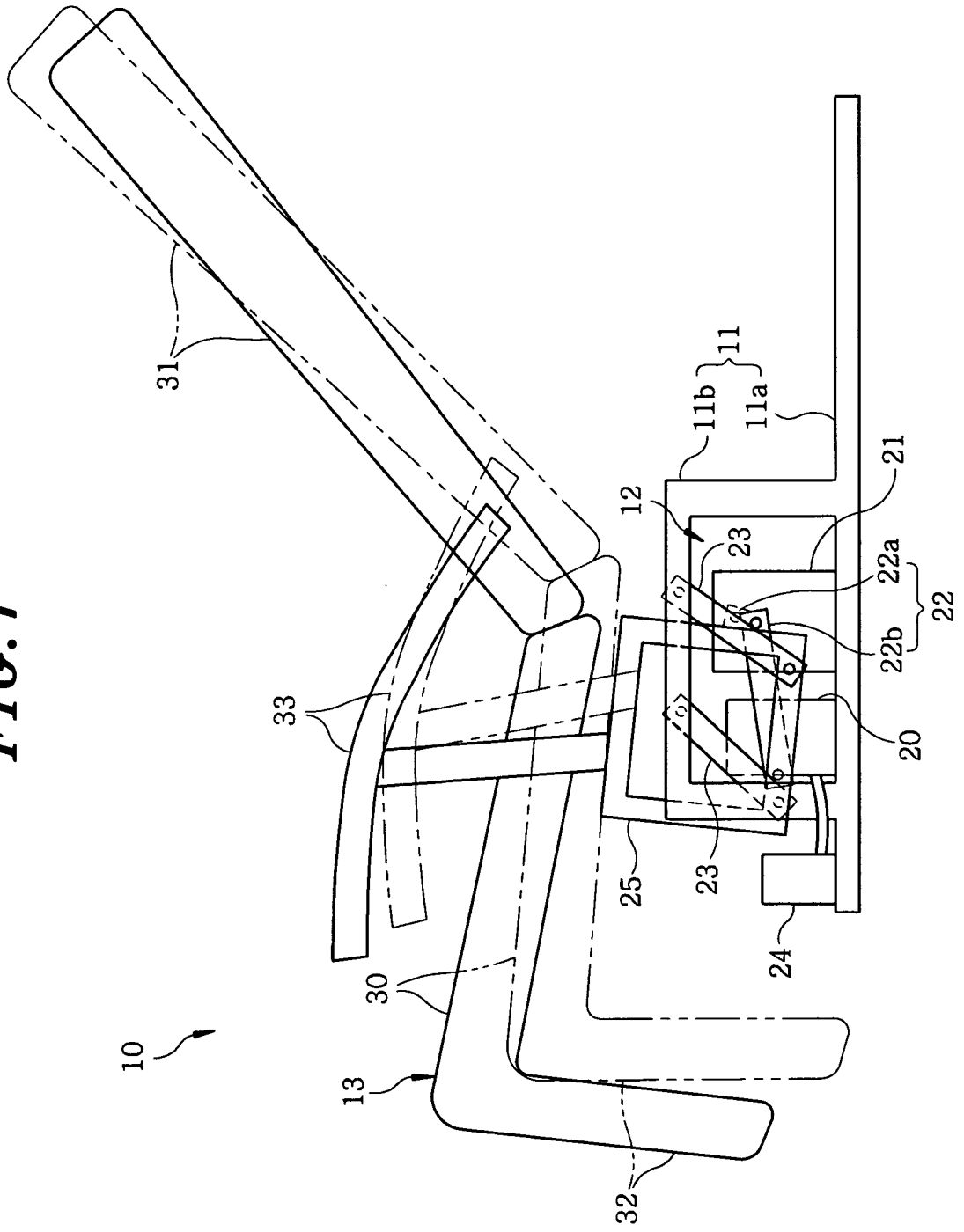


FIG.2

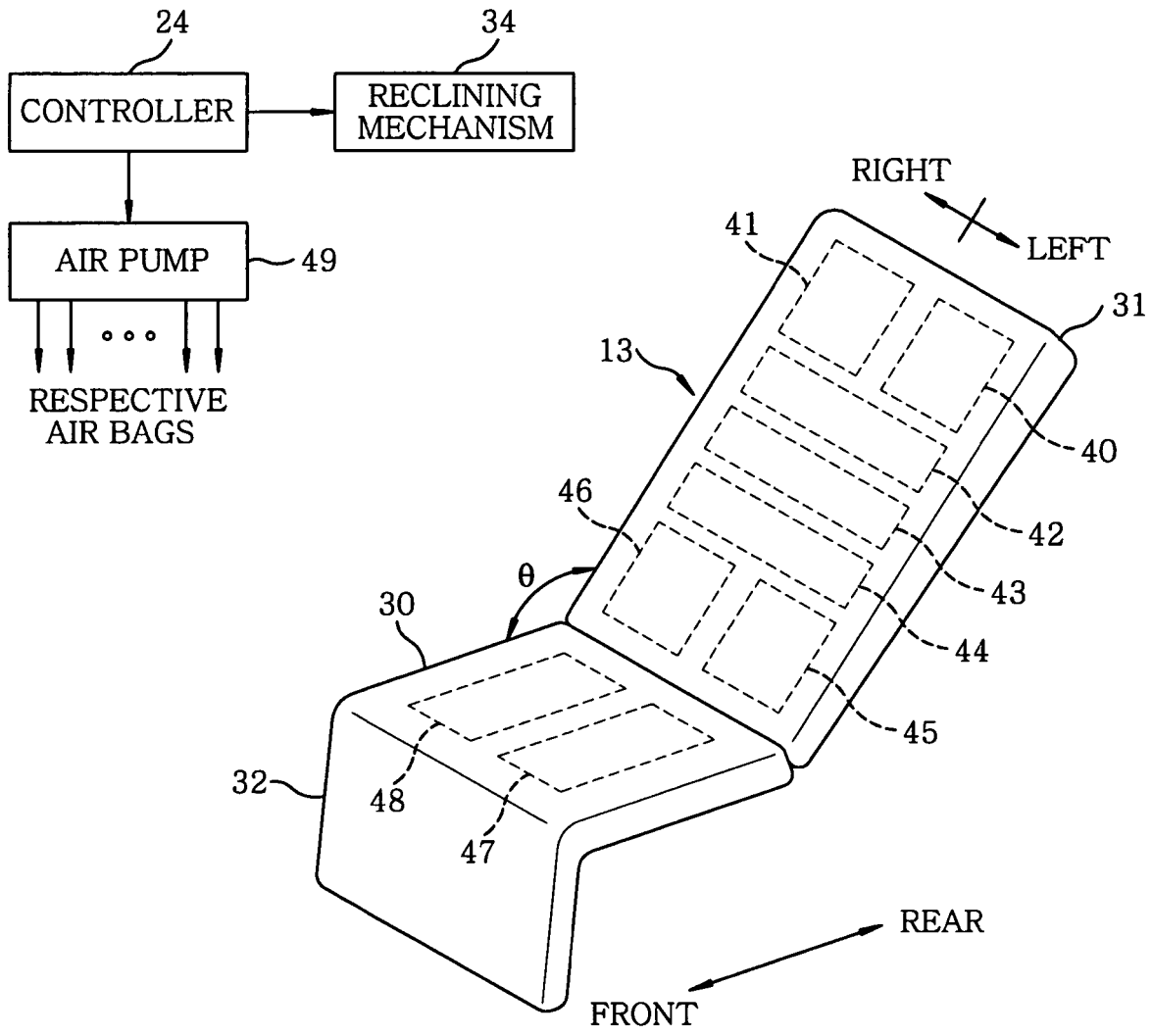

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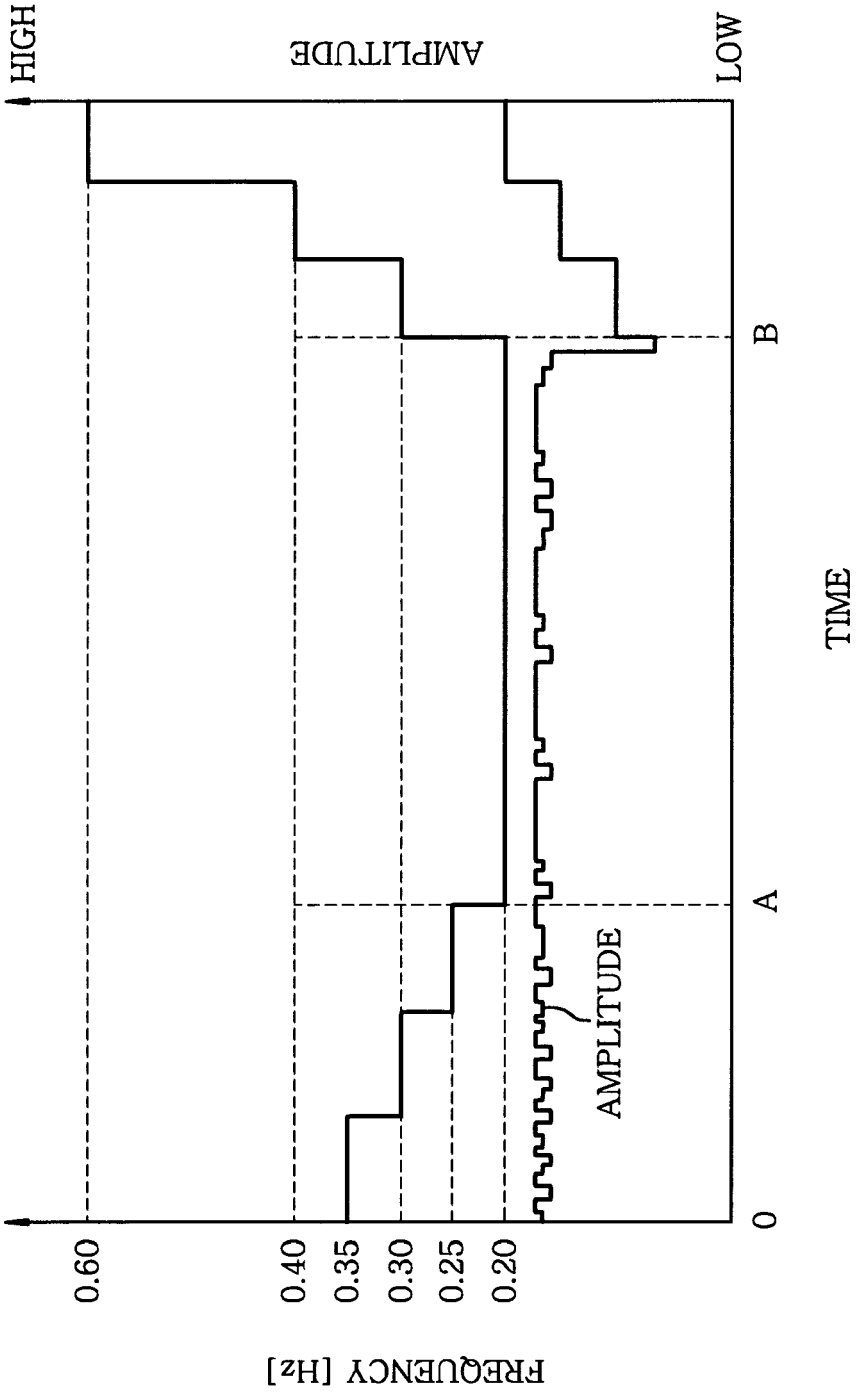
FIG.3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TIME
AMPLITUDE

FIG. 4

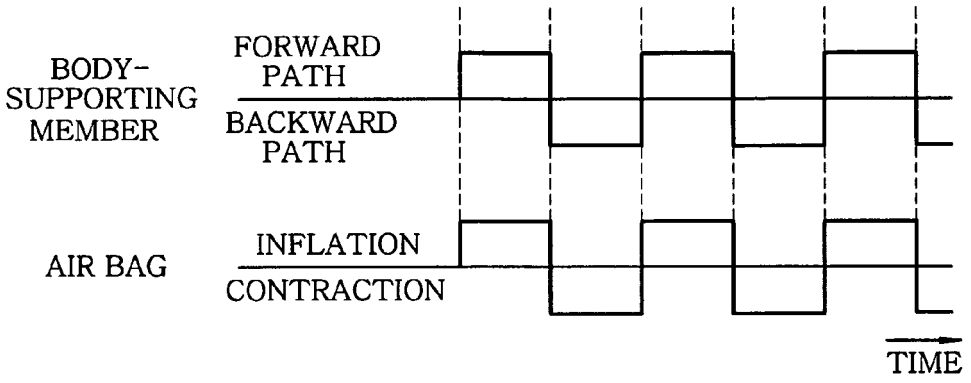


FIG. 5

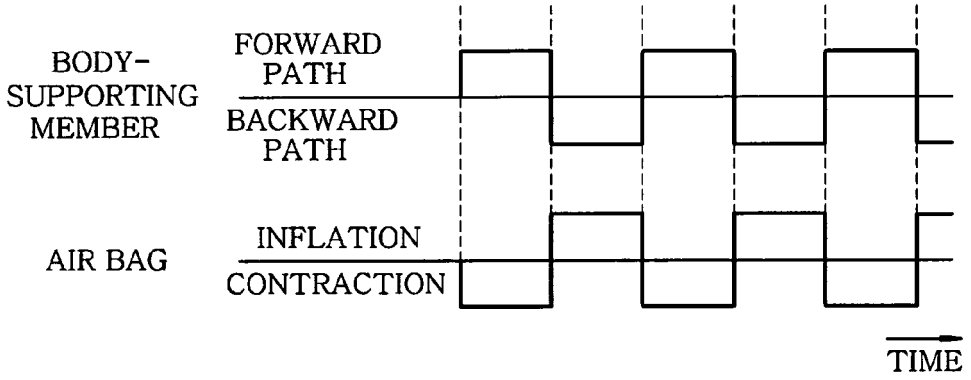
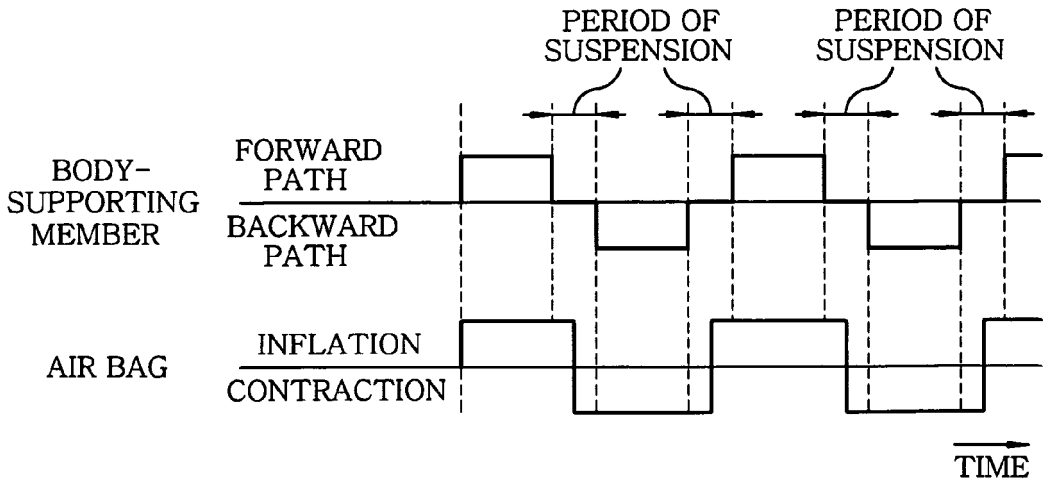


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 9996

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	WO 2007/119516 A (MATSUSHITA ELECTRIC WORKS LTD [JP]; TANIZAWA TAKAYOSHI [JP]; MIYAGUCHI) 25 October 2007 (2007-10-25) * the whole document *	1-10	INV. A61H1/00
X	& US 2009/099489 A1 (TANIZAWA TAKAYOSHI [JP] ET AL) 16 April 2009 (2009-04-16) * paragraphs [0005], [0032] - [0035], [0048] - [0051]; figures *	1-10	
X	US 2008/048475 A1 (TANIZAWA TAKAYOSHI [JP] ET AL) 28 February 2008 (2008-02-28) * paragraphs [0003], [0007], [0018] - [0020]; figures *	1-10	
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