SPECIFICATION

STROKE POWER GENERATION DEVICE AND CHAIR MASSAGER MACHINE INCLUDING THE STROKE POWER GENERATION DEVICE

TECHNICAL FIELD

[0001]

The present invention relates to a stroke power generation device performing massage treatment by applying stroke power to, for example, the affected part of a user and a chair massager machine including the stroke power generation device.

BACKGROUND ART

[0002]

There is conventionally known a massager machine as disclosed in Patent Document 1 as a chair massager machine. The massager machine disclosed therein includes a treatment element that swings and applies kneading massage or tapping massage to the affected part. This treatment element operates synchronously with audio signals (music).

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0003]

Patent Document 1: Japanese Unexamined Patent Publication JP-A 2004-174041

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004]

The massager machine disclosed in Patent Document 1 is

structured to actuate the treatment element by driving a drive motor. Due to this, even in the case where the treatment element is to operate synchronously with the audio signals, a lag possibly occurs between the music and the operation performed by the treatment element, resulting in reduction in the effect of performing massage treatment to music.

The present invention has been achieved in view of the aforementioned circumstances. It is an object of the present invention to provide a stroke power generation device and a chair massager machine capable of ensuring performing massage treatment to music by applying stroke power to the affected part to be interlocked with music.

MEANS ADAPTED TO SOLVE THE PROBLEMS

[0005]

To achieve the above-stated object, the present invention takes the following measures.

That is, technical measures of the present invention are to configure stroke power generation means adapted to perform massage treatment by applying stroke power to an affected part to be driven while being interlocked with music, to include: the stroke power generation means adapted to perform massage treatment by applying stroke power to the affected part; and control means adapted to control the stroke power generation means, wherein the control means outputs a driving signal interlocked with music, and controls the stroke power generation means.

[0006]

It is preferable that the control means outputs the driving signal obtained based on loudness of the music.

It is preferable that the control means outputs the driving signal obtained based on a beat component of the music.

It is preferable that the stroke power generation means includes: an excitation coil having a hollow portion at a center, the driving signal being input to the excitation coil; and a drive piston inserted into the hollow portion of the excitation coil.

[0007]

It is particularly preferable that the control means includes: a filter unit extracting a music signal obtained by excluding a predetermined frequency range from an input music signal; a trigger-signal generation unit generating a trigger signal based on an output from the filter unit; and a driving-signal generation unit generating the driving signal for moving the stroke power generation means based on the trigger signal output from the trigger-signal generation unit.

It is also preferable that the trigger-signal generation unit includes: a differential unit outputting a sharp fluctuation in the music signal output from the filter unit as a peak signal; an integral unit outputting a threshold obtained from an integral value of the music signal output from the filter unit; and a comparator generating the trigger signal by comparing the peak signal output from the differential unit with the threshold output from the integral unit.

[0008]

It is preferable to provide the above-stated stroke power generation device in a chair massager machine.

EFFECTS OF THE INVENTION

[0009]

According to the present invention, it is possible to ensure performing massage treatment to music by applying stroke power to the affected part in an interlocked fashion with music.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

[Fig. 1] Fig. 1 is a perspective view of a chair massager machine according to the present invention.

[Fig. 2] Fig. 2 illustrates a stroke power generation device.

[Fig. 3] Fig. 3 is a perspective view of a wearable massager machine.

[Fig. 4] Fig. 4 is a front view illustrating a state of using the wearable massager machine.

[Fig. 5] Fig. 5 is a back view illustrating a state of using the wearable massager machine.

[Fig. 6] Fig. 6 illustrates a mounted massager machine.

[Figs. 7(a) to 7(d)] Figs. 7(a) to 7(d) illustrate procedures for creating a drive signal to be output to stroke power generation means, wherein Fig. 7(a) illustrates a waveform of audio signals (music), Fig. 7(b) illustrates a waveform obtained by connecting peaks of the audio signals, Fig. 7(c) illustrates a state of clipping waveforms equal to

or higher than a threshold, and Fig. 7(d) illustrates the drive signal.

[Fig. 8] Fig. 8 illustrates an interior of control means as a block diagram (fourth embodiment).

[Fig. 9] Fig. 9 illustrates an interior of control means as a block diagram (modification of fourth embodiment).

BEST MODE FOR CARRYING OUT THE INVENTION

[0011]

A stroke power generation device and a chair massager machine according to the present invention are described hereinafter based on the drawings.

[First Embodiment]

Fig. 1 illustrates a chair massager machine including a stroke power generation device.

As shown in Fig. 1, a chair massager machine 1 includes a seat unit 2, a reclining backrest unit 3 provided in back of the seat unit 2, and a stroke power generation device 4 provided in the seat unit 2 and the backrest unit 3.

[0012]

The seat unit 2 is supported by a leg body 5 and set to have a predetermined height. Armrests 6 are provided on both of right and left sides of the seat unit 2, respectively. In the backrest unit 3, a backrest massage mechanism 8 that can perform kneading or tapping massage by causing a treatment element 7 to make swinging motion is vertically movably included. By allowing this backrest massage mechanism 8 to cause the treatment element 7 to make swinging motion, it is

possible to massage ranges from the waist to the neck of a body of a person seated in the seat unit 2.

[0013]

The chair massager machine 1 according to a first embodiment also includes a lower leg massager machine 10 massaging lower legs. More specifically, paired right and left longitudinally swingable support members 11 are provided on both of right and left sides of a front portion of the seat unit 2, respectively, and the lower leg massager machine 10 is attached swingably to these support members 11. This lower leg massager machine 10 includes a lower leg massage mechanism (not shown) massaging lower legs by swinging paired right and left lower leg massage members 12 arranged to be horizontally apart from each other in such a manner as to sandwich the lower legs therebetween. By allowing the lower leg massage mechanism to swing the lower leg massage members 12, it is possible to massage ranges from feet to calves of the body of the person seated in the seat unit 2.

[0014]

Additionally, the chair massager machine 1 includes, apart from the treatment element 7 of the backrest massage mechanism 8, stroke power generation means 15 for performing tapping massage treatment by repeatedly applying stroke power to the affected part. A plurality of stroke power generation means 15 can be arranged horizontally within the backrest unit 3 or can be arranged within the seat unit 2.

The stroke power generation means 15 differs in structure

from the backrest massage mechanism 8 and the lower leg massager machine as described later. The stroke power generation means 15 applies stroke power to the affected part by linear reciprocating motion. A stroke strength, a stroke cycle and the like of this stroke power generation means 15 are controlled by a driving signal output from control means 16 connected to the stroke power generation means 15. The stroke power generation means 15 and the control means 16 constitute the stroke power generation device 4.

[0015]

As shown in Figs. 2(a) and 2(b), the stroke power generation means 15 aims to apply stroke power to the affected part by moving a drive piston 17 in an axial center direction. The stroke power generation means 15 includes an excitation coil 18 (solenoid) having a wound conducting wire such as a copper wire, the drive piston 17 inserted into the excitation coil 18, and a case 19 accommodating the excitation coil 18 and the drive piston 17.

[0016]

More specifically, the excitation coil 18 is configured such that the conducting wire is wound and that a hollow portion 20 is created at the center. The driving signal is applied to the excitation coil 18 from the control means 16. The drive piston 17 is inserted into the hollow portion 20 of the excitation coil 18. An axial center direction of the hollow portion 20 is equal to that of the drive piston 17 and the drive piston 17 is concentrically inserted into the hollow portion

20. The drive piston 17 is configured such that a rod iron core that is a magnetic body is axially coupled to a synthetic resin rod that is a nonmagnetic body.

[0017]

The case 19 accommodates the excitation coil 18 and the drive piston 17 inserted into the excitation coil 18. A doorway 21 which a tip end side of the drive piston 17 goes in and out of is provided at least on one side of the case 19. For convenience of description, a doorway 21-side which the tip end portion 17a of the drive piston 17 goes in and out of is referred to as "stroke action side".

On the stroke action side of the case 19, a band-like elastically deformable spring material 22 is provided to close the doorway 21 of the case 19. In each case 19, the side (stroke action side) on which the spring material 22 is provided is turned to either a (massaging side) surface of the backrest unit 3 or a (massaging side) surface of the seat unit 2.

[0018]

As shown in Fig. 2(a), in a state in which the control means 16 does not output a driving signal (current) to the excitation coil 18, the drive piston 17 is pushed back to the case 19 by the spring material 22. Therefore, the tip end portion 17a of the drive piston 17 is located in the case 19 and in a state of not going out of the doorway 21.

As shown in Fig. 2(b), in the case where the control means 16 outputs a driving signal to the excitation coil 18, then an electromagnetic force is generated in the excitation coil

18, the electromagnetic force prompts the drive piston 17 to move in a direction of jumping out of the case 19 against a push-back force of the spring material 22, and the excitation piston 18 goes out of the doorway 21 of the case 19. In a state of continuously outputting driving signals to the excitation coil 18, the drive piston 17 remains jumping out of the doorway 21. In the case where the control means 16 stops outputting driving signals to the excitation coil 18, then it is only the push-back force of the spring material 22 that acts on the drive piston 17, and the drive piston 17 moves in a direction of going back into the excitation coil 18.

[0019]

That is, when current is supplied to the excitation coil 18, a part of the drive piston 17 projects from the hollow portion 20 of the excitation coil 18. When current is cut off, the drive piston 17 returns to the hollow portion 20 located at the center of the excitation coil 18 by an elastic force of the band-like spring material 22. By repeating the operation, the drive piston 17 repeatedly makes in-and-out motion and can apply stroke massage (tapping massage) to the affected part.

[0020]

Note that the spring material 22 provided in the stroke power generation means 15 is not necessarily an essential member. Even the stroke power generation means 15 without the spring material 22 can perform comfortable stroke massage by applying an AC driving signal to the excitation coil 18 to cause

the drive piston 17 to make in-and-out motion. Even in the case where a pulsed driving signal alternately outputting plus-side pulses and zeros is applied to the excitation coil 18, the drive piston 17 makes in-motion by a reactive force to out-motion. Therefore, the drive piston 17 is ensured to make in-and-out motion.

[0021]

Meanwhile, the control means 16 outputs a driving signal (current) interlocked with music to the excitation coil 18 and is included, for example, in the chair massager machine.

This control means 16 includes a music data storage unit 25 storing music data in advance. The music data storage unit 25 stores various music data, and it is possible to appropriately select a type (genre) of music, a name of music, an artist name of music or the like from among the music data by means of a remote controller or the like. The music encompasses herein not only artificially produced music but also recorded natural sounds such as winds, waves, and animal calls.

[0022]

The control means 16 outputs a driving signal based on audio signals corresponding to the selected music data from the music data storage unit 25. For example, the control means 16 can output a driving signal interlocked with amplitude or frequency of the audio signals or a driving signal interlocked only with a signal at specific frequency among the audio signals.

Furthermore, the control means 16 can output a driving signal when a signal at intensity equal to or higher than predetermined intensity (having amplitude equal to or higher than predetermined amplitude) is present in the audio signals.

[0023]

Figs. 7(a) to 7(d) illustrate an example of outputting a driving signal based on loudness (strength) of music(sound).

In the case of outputting a driving signal according to the loudness of music(sound), then the control means 16 first reads audio signals from the music data storage unit 25 as shown in Fig. 7(a), and smoothly connects peaks of the read audio signals as shown in Fig. 7(b). This process can be performed by a peak detection circuit configured to include a half-wave rectifier-smoothing circuit and the like.

[0024]

Next, as shown in Fig. 7(c), the control means 16 clips parts equal to or higher than a threshold L from a waveform having the connected peaks, and extracts trigger signals (denoted by symbol A and A' in Fig. 7(c)) triggered by base points of the clipped parts of the waveform, respectively. Note that either a fixed value or a value obtained by averaging amplitudes of the audio signals can be adopted as the threshold L.

Thereafter, as shown in Fig. 7(d), the control means 16 outputs a pulse waveform having a predetermined width (for example, 3 msec) with the time points at which the trigger signals are extracted as leading edges (output start points)

of the driving signal. This pulse waveform is input to the stroke power generation means 15, thereby driving the stroke power generation means 15 to music.

[0025]

While a hardware circuit can realize processes shown in Figs. 7(a) to 7(d), software processing can be also used. That is, it suffices to perform software processing including a processes of converting externally input audio signals (music) to digital data and storing the digital data in the music data storage unit 25, and processes including peak detection and clipping of the parts of the waveform equal to or higher than the threshold and performed on the digital data extracted from this music data storage unit 25.

[0026]

Furthermore, the control means 16 can extract a beat component (time and rhythm such as a sound produced by a drum part or a base part) from the audio signals and output a driving signal according to the beat component. That is, the control means 16 can output a driving signal obtained based on the beat component of music.

Aside from the above-stated ways of outputting the driving signal, a programmer or the like can create an output pattern of the driving signal interlocked with music in advance.

[0027]

By applying the driving signal interlocked with music to the excitation coil 18 from the control means 16 as stated

above, it is possible to, for example, freely change an in-and-out speed of the drive piston 17 or a degree of projection of the drive piston 17 according to the loudness of music (sound), to freely change in-and-out intervals of the drive piston 17 according to the rhythm of the music, and perform massage treatment synchronized with the music.

[0028]

Besides, a speed of the stroke massage performed by the stroke power generation means 15 (a reaction speed of the motion of the drive piston 17) is very high. Due to this, it is possible to drive the stroke power generation means 15 in an interlocked manner with the music without a lag. For the reason, it is possible to prevent a time lag between the music and the massage treatment (massage by a kneading mechanism) differently from the conventional technique, and to ensure performing massage treatment to music.

[0029]

A music reproducing unit 26 for reproducing music is connected to the control means 16 and the music reproducing unit 26 reproduces the selected music data. This enables a user to get a massage by the stroke power generation means 15 while listening to music.

In the above description, the control means 16 includes the music data storage unit 25 storing music data in advance. Alternatively, the control means 16 can include an input unit that accepts a recording medium (such as a CD) recording music and can output a driving signal according to the music data

(such as WAVE data or MP3 data) recorded in the recording medium and prepared by the user.

[0030]

Moreover, in the case where the stroke power generation device 4 includes a plurality of stroke power generation means 15, various driving signals to be output according to audio signals can be appropriately applied to the respective stroke power generation means 15.

For example, the audio signals are subjected to FFT to be divided into a high frequency component, an intermediate frequency component, a low frequency component or the like. The stroke power generation means 15 to which the driving signal is to be output can be appropriately changed for every frequency component. At this time, in the case where the high frequency component or the intermediate frequency component of the audio signals is output when reproducing music, the driving signal is output to the stroke power generation means 15 arranged in the backrest unit 3. In the case where the low frequency component of the audio signals is output, the driving signal is output to the stroke power generation means 15 arranged in the seat unit 2. In this way, locations of the stroke power generation means 15 to which the driving signal is output can be changed for every frequency. This can change the affected parts to be massaged according to music.

[0031]

Moreover, it is preferable to perform massage operations performed by the backrest massage mechanism 8 and the lower

leg massage mechanism and that performed by the stroke power generation device 4 in independent and non-interlocked manners. Alternatively, all the massage mechanisms can be interlocked to operate according to music data. In other words, the operations performed by the backrest massage mechanism 8 and the lower leg massage mechanism can be either interlocked or non-interlocked with the music data.

[0032]

Furthermore, an LED illumination lamp or the like having various colors can be disposed around the chair massager machine 1 and luminous intensity of this LED illumination lamp can be controlled based on "the driving signal obtained based on the music data" and output from a control unit.

[Second Embodiment]

In the first embodiment, the stroke power generation device 4 is provided in the chair massager machine 1. In a second embodiment, the stroke power generation device 4 operating to be interlocked with music is provided in a handy-type (portable) wearable massager machine that a user U can wear over the shoulders of the user U.

[0033]

The second embodiment differs from the first embodiment only in positions of the stroke power generation means 15 of the stroke power generation device 4 but is similar in control exerted by the control means 16 of the stroke power generation device 4. Therefore, the control exerted by the control means 16 of the stroke power generation device 4 is similar to that

according to the first embodiment and not described herein.

As shown in Figs. 3 to 5, a wearable massager machine 30 is folded back at a border that is a longitudinal central portion of the wearable massager machine 30 and worn by the user U by putting this longitudinal central portion over the shoulders of the user U. Fig. 3 is a diagonal front view illustrating the wearable massager machine 30 folded back at the border that is the longitudinally central portion, similarly to a state in which the user U wears the wearable massager machine 30.

[0034]

As shown in Figs. 3 to 5, the wearable massager machine 30 includes a front covering body 31 covering a front side (abdominal side) of the user U and a back covering body 32 covering a rear side (back side), which bodies are separated at the border that is the central portion and at which the wearable massager machine 30 is folded back. The stroke power generation means 15 of the stroke power generation device 4 is provided in the back covering body 32. The control means 16 is included in a remote controller 33 provided on a lower side of the front covering body 31. The control means 16 can be configured separately from the above-stated remote controller 33 and separately included in a device such as the wearable massager machine 30.

[0035]

The front covering body 31, which is formed long vertically, is designed to cover up regions from the shoulders

to an abdominal region of the user U while contacting these regions. The front covering body 31 is made of synthetic fiber (synthetic leather) or the like and an elastic cushion material (not shown) such as expanded polyurethane is arranged inside the front covering body 31. A through-hole 34 is formed at the center of the front covering body 31 and grip units 35 are provided on the lower side of the front covering body 31.

[0036]

The through-hole 34 is formed at the center of the front covering body 31 and penetrates the front covering body 31 in a front-back direction from the perspective of the user U. A horizontal opening of the through-hole 34 is formed to be sufficiently wider than a head region of the user U so that the user U can insert the head region into the through-hole 34 without trouble. Further, the through-hole 34 is an elongated hole longer vertically than horizontally so that the user U can vertically move the front covering body 31 with the head region inserted into this through-hole 34.

[0037]

The back covering body 32 is formed vertically long similarly to the front covering body 31 so that the back covering body 32 can cover up regions from the shoulders to a waist region of the user U while contacting these regions. The back covering body 32 includes a first treatment unit 37 provided in an upper portion, a second treatment unit 38 provided in a lower portion, and a connecting unit 39 vertically connecting the first treatment unit 37 to the second treatment

unit 38.

[0038]

As shown in Fig. 5, paired right and left stroke power generation means 15 massaging the affected parts of the user U are arranged in the first treatment unit 37. This first treatment unit 37 is located on the shoulders of the user U so that the stroke power generation means 15 provided inside can mainly massage the shoulders and the neck of the user U.

Similarly to the first treatment unit 37, the second treatment unit 38 is made of synthetic fiber (synthetic leather) and a cushion material is arranged inside the second treatment unit 38. Similarly to the first treatment unit 37, paired right and left stroke power generation means 15 massaging the affected parts of the user U are arranged in the second treatment unit 38. This first treatment unit 37 is located on the waist of the user U so that the stroke power generation means 15 provided inside can mainly massage the waist and the back of the user U.

[0039]

Paired right and left long stretching bodies 40 stretchable outward from right and left outer edges of the second treatment unit 38, respectively are provided on this second treatment unit 38. By user U's grasping tip ends of these stretching bodies 40 and pulling forward from the perspective of the user U, it is possible to strongly press the first treatment unit 37 and the second treatment unit 38 against the affected parts and further ensure massaging the

affected parts.

[Third Embodiment]

In the first embodiment, the stroke power generation device 4 is provided in the chair massager machine 1. In a third embodiment, the stroke power generation device 4 operating to be interlocked with music is provided in a mounted massager machine.

[0040]

The third embodiment differs from the preceding embodiments only in installation positions of the stroke power generation means 15 of the stroke power generation device 4 but is similar in control exerted by the control means 16 of the stroke power generation device 4. Therefore, the control exerted by the control means 16 is similar to that according to the preceding embodiments and is not described herein.

The control means 16 is included in the mounted massager machine.

As shown in Fig. 6, a mounted massager machine 45 can massage the lower legs while being disposed on a floor or the like, and includes a casing 46 disposed on the floor or the like and paired right and left lower leg massage members 12 provided in this casing 46 and arranged to be horizontally apart from each other so as to sandwich the lower legs therebetween. Each of the lower leg massage members 12 is plate-like and, in a side view, boot-like along the lower leg continuous from the calf to the foot. In other words, each lower leg massage member 12 is formed into a generally L shape in a side view.

The paired lower leg massage members 12 and the casing 46 form a recess 47 into which the lower legs are inserted.

[0041]

Furthermore, a lower leg massage mechanism 48 swinging the paired lower leg massage members 12 is provided in the casing 46. By actuating this lower massage mechanism 48, the lower legs inserted into the recess 47 are sandwiched between the lower leg massage members 12, thereby making it possible to massage the calves and sides of the feet.

Mounting units 49 on which the feet (soles of the feet) are mounted, respectively are provided on a bottom of the casing 46 and the stroke power generation means 15 is provided in each of the mounting units 49. More specifically, the case 19 is provided on each mounting unit 49 so as to be able to turn up the tip end portion 17a of the drive piston 17. In other words, the stroke power generation means 15 is provided at positions corresponding to the toe, heel, arch and the like so that the stroke power generation means 15 can perform stroke massage on the soles of the feet.

[Fourth Embodiment]

In the first embodiment, the control means 16 generates a driving signal after performing the signal processing shown in Figs. 7(a) to 7(d), and drives the stroke power generation means 15 of the chair massager machine 1 based on the obtained driving signal.

[0042]

In a fourth embodiment, "a method of generating a driving

signal output to the stroke power generation means 15″ different from the signal processing method disclosed in the first embodiment is described.

As shown in Fig. 8, the control means 16 includes an amplifier unit 60 amplifying music signals (audio signals), a filter unit 61 extracting a low frequency range and a high frequency range from the audio signals amplified by this amplifier unit 60, a trigger-signal generation unit 62 generating trigger signals based on an output from this filter unit 61, and a driving-signal generation unit 63 generating a driving signal for moving the stroke power generation means 15 based on the generated trigger signals.

[0043]

More specifically, the amplifier unit 60 amplifies externally input audio signals, and an existing audio amplifier IC or the like can be adopted as the amplifier unit 60.

The audio signals (Fig. 8(a)) amplified by the amplifier unit 60 are introduced to the filter unit 61. The filter unit 61 includes a low-pass filter 64 extracting the low frequency range produced by a drum or the like and a high-pass filter 65 extracting the high frequency range produced by an electric guitar or the like. By passing the audio signals through this filter unit 61, an intermediate frequency range, that is, audio signals except for a vocal (a human voice) and the like are extracted. In this way, by excluding a vocal range, it is possible to avoid inadvertently driving the stroke power

generation device 4 and ensure performing stroke massage to be interlocked with music.

[0044]

As shown in Fig. 9, the filter 61 can also include a band-pass filter 69 passing through the intermediate frequency range. By doing so, music signals obtained by excluding predetermined frequency ranges from the input music signals (music signals obtained by excluding an extremely low frequency range or an extremely high frequency range) are extracted, and it is possible to realize stroke massage while avoiding inadvertent stroke although the stroke massage is surely interlocked with music. In Fig. 9, the constituent elements other than the band-pass filter 69 are similar to those shown in Fig. 8.

[0045]

The signals output from the filter unit 61 are introduced to the trigger-signal generation unit 62 that includes a differential unit 66, an integral unit 67, and a comparator 68.

Specifically, the signals from the filter unit 61 are introduced to the differential unit 66, and the differential unit 66 extracts sharply fluctuating parts of the music as peak signals (differential waveform). At the same time, the signals from the filter unit 61 are introduced to the integral unit 67, and the integral unit 67 obtains an integral value of the signals, that is, a value corresponding to an average value. This value is used as the threshold L.

[0046]

The peak signals output from the differential unit 66 and the threshold L obtained by the integral unit 67 are input to the comparator 68, which clips parts equal to or higher than the threshold L from the peak signals and outputs the trigger signals (denoted by symbols A and A' in Fig. 8(b)) triggered by base points of the clipped parts of the waveform, respectively.

The integral unit 67 calculates the threshold L by averaging amplitudes of the input audio signals. Due to this, the integral unit 67 can always calculate the appropriate threshold L even with changes in intensities (magnitudes) of the audio signals.

[0047]

Thereafter, an output from the comparator 68, that is, from the trigger-signal generation unit 62 is input to the driving-signal generation unit 63. The driving-signal generation unit 63 outputs driving AC having a predetermined time width with the time points (A and A'), at which the trigger signals are extracted (A and A') as shown in hatched region of Fig. 8(c), used as output start points of the driving signal (driving AC output). It suffices to set the time width for outputting the driving AC according to desired strength of the stroke power generation means 15 and, for example, to set the output time width to 3 to 4 msec.

[0048]

In Fig. 8(c), the time points at which the trigger signals

are extracted are set as output start of outputting the driving signal to the excitation coil 18, irrespectively of polarity of the driving AC output. This ensures that the stroke power generation means 15 operates to music without delay. Nevertheless, it is possible to set the time points at which the trigger signals are extracted as output start of outputting the driving signal to the excitation coil 18 as long as the driving AC output has positive polarity (or one polarity).

[0049]

The driving signal (driving AC output) generated as stated above is input to the stroke power generation means 15, thereby driving the stroke power generation means 15 to music.

The processing of the fourth embodiment stated so far can be realized either by using a hardware circuit or by software processing.

The present invention is not limited to the above-stated embodiments but shapes, structures, materials, combinations and the like of the members can be appropriately changed without changing the scope and spirit of the invention.

DESCRIPTION OF REFERENCE SYMBOLS

[0050]

1 Chair massager machine

2 Seat unit

3 Backrest unit

4 Stoke power generation device

5 Leg body

6 Armrest

7 Treatment element

8 Backrest massage mechanism

10 Lower leg massager machine

11 Support member

12 Lower leg massage member

15 Stroke power generation means

16 Control means

17 Drive piston

17a Tip end portion

18 Excitation coil

19 Case

20 Hollow portion

21 Doorway

22 Spring material

25 Music data storage unit

26 Music reproducing unit

30 Wearable massager machine

31 Front covering body

32 Back covering body

33 Remote controller

34 Through-hole

35 Grip unit

37 First treatment unit

38 Second treatment unit

39 Connecting unit

40 Stretching body

45 Mounted massager machine

46 Casing

47 Recess

48 Lower leg massage mechanism

49 Mounting unit

60 Amplifier unit

61 Filter unit

62 Trigger-signal generation unit

63 Driving-signal generation unit

64 Low-pass filter

65 High-pass filter

66 Differential unit

67 Integral unit

68 Comparator

69 Band-pass filter

WHAT IS CLAIMED IS:

1. A stroke power generation device comprising stroke power generation means adapted to perform massage treatment by applying stroke power to an affected part, wherein

the stroke power generation means is driven to be interlocked with music.

2. A stroke power generation device comprising:

stroke power generation means adapted to perform massage treatment by applying stroke power to an affected part; and

control means adapted to control the stroke power generation means, wherein

said control means outputs a driving signal interlocked with music, and controls said stroke power generation means.

3. The stroke power generation device according to claim 2, wherein

said control means outputs the driving signal obtained based on loudness of the music.

4. The stroke power generation device according to claim 2, wherein

said control means outputs the driving signal obtained based on a beat component of the music.

5. The stroke power generation device according to any one of claims 1 to 4, wherein

said stroke power generation means includes:

an excitation coil having a hollow portion at a center, said driving signal being input to the excitation coil; and

a drive piston inserted into the hollow portion of said excitation coil.

6. The stroke power generation device according to any one of claims 1 to 5, wherein

said control means includes:

a filter unit extracting a music signal obtained by excluding a predetermined frequency range from an input music signal;

a trigger-signal generation unit generating a trigger signal based on an output from said filter unit; and

a driving-signal generation unit generating the driving signal for moving the stroke power generation means based on the trigger signal output from said trigger-signal generation unit.

7. The stroke power generation device according to claim 6, wherein

said trigger-signal generation unit includes:

a differential unit outputting a sharp fluctuation in the music signal output from said filter unit as a peak signal;

an integral unit outputting a threshold obtained from an integral value of the music signal output from said filter unit; and

a comparator generating the trigger signal by comparing the peak signal output from said differential unit with the threshold output from the integral unit.

8. A chair massager machine comprising the stroke power generation device according to any one of claims 1 to 7.