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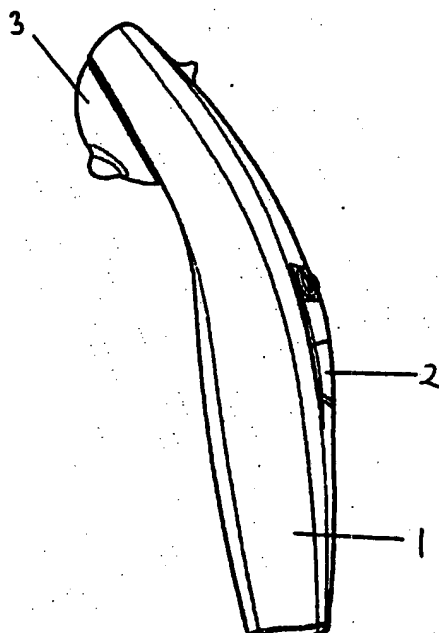
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(54) **Body massager**

(57) A body massager comprising a housing, a massage head movable independently of the housing; a motor which drives movement of the massage head, a microprocessor which controls the motor to vary at least one of amplitude, frequency or direction of movement of the massage head based on movement data and an

interface through which movement data can be provided to alter the control of the motor.

A system for exchanging information with the above body massager, the system additionally comprising a computer configurable to be connected to the manager and means for connecting the massager to a computer.



**FIGURE 1C**

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## Description

**[0001]** The present invention relates to a body massager.

**[0002]** There are many types of currently known body massagers which aim to produce pleasant, stress-relieving sensations when applied to the body. Body massagers with electrically powered motors are available so that movement such as vibration can be produced to improve the quality of massaging without increasing effort required by the user.

**[0003]** Some motorised body massagers have several different settings, for example, the choice of several different vibration frequencies. However, the options a user has to choose from are very limited and no massagers offer programmable variation in the motion characteristics of the massager during the course of a massage session.

**[0004]** The present invention aims to overcome these limitations of conventional body massagers and aims to provide a body massager with a high degree of programmability and user control.

**[0005]** According to the present invention there is provided a body massager comprising:

- a housing;
- a massage head moveable independently of the housing;
- a motor which drives, in use, movement of the massage head;
- a microprocessor which controls the motor, in use, based upon movement data to vary at least one of the amplitude, frequency or direction of movement of the massage head; and
- an interface through which the movement data can be input to alter control of the motor.

**[0006]** According to the present invention there is provided a system for exchanging information with a body massager, the system comprising:

- a body massager of the type defined above;
- a computer configurable to be connected to the massager and arranged, in use, to provide control information thereto; and
- means for connecting the massager to the computer.

**[0007]** An example of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1A shows a perspective view of the user interface face of a body massager according to an example of the present invention;

Figure 1B shows a perspective view of the massage head face of a body massager according to an example of the present invention;

Figure 1C shows a side perspective view of a body massager according to an example of the present invention;

Figure 2A shows a schematic perspective view of the mechanical inside parts of a body massager according to an example of the present invention, looking from the user interface face of the massager;

Figure 2B shows a side perspective view of the mechanical inside parts, massage head and a portion of the housing of a body massager according to an example of the present invention;

Figure 2C shows a perspective view of the mechanical inside parts, massage head and a portion of the housing of a body massager according to an example of the present invention, looking from the massage head face of the massager; and

Figure 3 shows a flow diagram of the key functions of a body massager according to a example of the present invention.

**[0008]** Referring to Figure 1, an example body massager according to the present invention has a housing 1 which encases a massage head 3, and an LCD display 2 (covered by a clear plastic display window). Various control buttons are provided in the housing 1. In this example there is a power key 4, a run/pause key 5, a scroll key 6 and a pleasure control key 7.

**[0009]** The massager may be powered by rechargeable batteries, in which case there is an opening in the housing 1 for a power recharge socket.

**[0010]** There may also be openings in the housing 1 for other sockets such as a USB port and an audio input, which will be discussed later. The sockets can be covered so that only desired sockets are exposed at any time.

**[0011]** The housing 1 may be compatible with different interchangeable massage heads 3 which can snap on and off a hub on the housing 1. A seal may be provided at the point of attachment for massage heads 3 to prevent ingress of liquids such as massage oil from entering the housing 1.

**[0012]** Referring to Figure 2, the massage head 3 is powered by three electric motors 8, 9, 10. Reference numeral 10 shows the position of the third motor, the motor itself not being shown. One motor 8 controls rotational motion, one 9 linear motion (sliding on one axis) and one 10 vibration. The motors 8, 9, 10 have associated gear trains 11, 12 which are also connected to a sliding chassis base 13. The massage head 3 is connected to this mechanical system via a shaft 14.

**[0013]** The motors 8, 9, 10 are controlled by an on-board microprocessor which is connected to, in this example, to a flash memory chip and can also be connected to a ROM chip. This electronic package controls the motors 8, 9, 10 under the direction of firmware stored in the ROM. Movement instruction data for the microprocessor is also stored.

**[0014]** The movement data or "score" instructs the motor control software, the motors 8, 9, 10 and ultimately the massage head 3, to "perform" a unique massage "motion". Each unique Score creates a unique sequence of massage movements and vibrations with a specified time duration.

**[0015]** In this example, the head 3 rotates in reciprocation, describing an angular segment of between 45 and 360 degrees, but may have a different range. This segment can be indexed to any angular position. The speed of this motion varies according to software control, with a maximum, for example, of about 1 cycle/sec.

**[0016]** The motor 8 that drives rotational motion is a stopper motor that drives the massage head shaft 14 via a reduction gear train 11. It is able to turn both clockwise and counterclockwise. The position of the massage head shaft 14 is read and fed back to the microprocessor by sensors, which may be optical, and an encoder disc attached to the drive system 14.

**[0017]** The motor 8, gear train 11 and encoder sub-assembly is mounted in an independent chassis 13 that is able to slide smoothly within the housing 1 along the centre axis of the massager. The output shaft 14 to the massage head therefore exits the housing 1 through an elongated slot.

**[0018]** In this example, sliding motion of the head 3 occurs along the centreline axis of massager. This is a reciprocating motion with a displacement of 10mm. There is a feedback sensor, which may be optical, to locate the parking position of the head 3. Otherwise it is not necessary to continuously monitor the head's position on the sliding axis. The speed of this motion varies according to software control, with a maximum, for example, of about 2 cycle/sec.

**[0019]** The motor 9 which controls sliding motion is a DC motor. It is rigidly mounted inside the housing 1 and drives the motor chassis 13 via a reduction gear train 12 and a crank mechanism. A feedback device, which may be optical, registers the parking position of the head 3.

**[0020]** In this example, vibration is provided to the whole massager by a revolving, eccentric mass positioned so as to focus the vibration displacement as close to the massage head 3 as possible. The vibration frequency varies according to software control, but may be in the range 0-120 hertz. The amplitude may be about 1mm at the head 3 "bumps".

**[0021]** The motor 10 which controls vibration is a DC motor mounted rigidly within the motor chassis 13 assembly and which drives directly a shaft-mounted eccentric mass. This provides vibration to the head 3.

**[0022]** The mechanical parts such as gears, crank and chassis may be moulded from plastics material such as nylon and may be self-lubricating, or, if the structure requires it, certain components may be metal.

**[0023]** A small number of Scores can be permanently stored on the massager but additional Scores can be uploaded to the massager from a desktop or laptop PC

or Macintosh and stored in flash memory. The connected computer can be used to view the Scores in flash memory, manage the contents of the massager's memory and download, copy and delete files from the massager's memory. It may also upload software updates to the massager, which can be automatic. This may be from a website or other remote location port. An opening in the housing 1 may be provided for a USB socket, for example, to allow this connection to a computer. The USB may be miniature sized.

**[0024]** The display 2 and control keys 4, 5, 6, 7 allow a user to choose a Score, run it and intervene to some extent in its execution.

**[0025]** Figure 3 shows the sequence of possible events on using the massager. After pressing 15 the power key 4, the user sees a Score name on the LCD display 2. Pressing the scroll key 6 left 16 or right 17 will scroll the Score names horizontally across the display 2. When the chosen Score is centred on the display 2, the user presses 18 the run key 5 to run the Score and the massage head 3 begins to move and vibrate autonomously according to the Score movement data. The massage head 3 is applied to the body. The default display in the run mode is a progress bar.

**[0026]** During the massage the user can have some control. Pressing the scroll key 6 causes the Score to skip backwards 23 or forwards 24. Pressing 25 the run key 5 pauses the Score (and pressing again 28 resumes). Pushing and holding 29 the run key exits the run mode. Pushing the pleasure control key 7 forwards 20 intensifies the massage sensation and pushing it backwards 21 reduces the sensation. Pushing down and holding 22 the pleasure control key 7 causes the Score to run the current motion/vibration pattern indefinitely (until pushing and holding 26 the run key 5 exits the run mode).

**[0027]** If at any time the power key 4 is pushed down and held 19, 27, 30, the massager turns off.

**[0028]** In a further embodiment, the massager may have an audio input socket to enable a "music mode". In this mode a user feeds an audio signal from a portable music player to the massager, causing the massage head 3 movements to be synchronised to some extent with the music being played. A user listens to the music with an earpiece while being massaged "in time" to the music.

**[0029]** An example of control of the massager from a computer will now be described.

**[0030]** A few portions of movement data, comprising settings for the motors 8, 9, 10 are processed a number of times per second. Typical issue rates may be in the range 4 to 20 times a second. These periodic instruction sets are called frames. Each frame defines the desired settings for each of the motors 8, 9, 10 for that moment. Additional data defining the time delay between each frame is also sent, allowing this time to be varied during the playing of a Score.

**[0031]** As a response to each frame, a data is gener-

ated portraying what is known about the motors 8, 9, 10 and the keys 4, 5, 6, 7. These describe the head 3 angular position, the key states, whether the head 3 is at its parked position or not in its linear travel, and current drain on rotary motor 8 and linear motor 9.

**[0032]** The massager can be operated in a direct control mode, in which a PC is connected by a USB cable to the massager during use.

**[0033]** The massager can also be operated in a stored data mode, in which the bytes for all frames are downloaded and stored in sequence in flash memory and the massager is used independently of a PC.

**[0034]** The bidirectional motor 8 for rotation has an encoder disc allowing the absolute position of the massage head 3 to be ascertained so that both the relative pattern of motion and absolute position are known. The motor 8 may be controlled by sending signals requesting it to attempt to turn to a particular angular position each frame. If the encoder disc distinguishes 256 different angles, for example, (each just under 1.5 degrees apart) then one byte per frame would be sufficient to specify the intended location.

**[0035]** The motor 9 moving the head 3 in a linear up/down motion is a unidirectional motor, and only needs a single power setting value per frame. Four bits are sufficient to distinguish 16 different power settings. This motor 9 has limited feedback and can report whether the motor 9 is at or passed through its parked position at some time since the previous frame. Power drain measurements may also be available; the relation between these and the power supplied indicates how much resistance the user is applying.

**[0036]** The vibrator motor 10 is controlled by altering the fraction of total power driving it. There is no feedback from this motor. A single power value is sent each frame. This could be expressed in 4 bits, allowing 16 different power settings.

**[0037]** The above arrangement allows a Score to be played through from beginning to end. However the user may manipulate a playing Score as previously mentioned, by pressing a key 4, 5, 6, 7 to request an action, by connecting audio in line to a signal or by resisting the motion of the head 3.

an interface (2) through which the movement data can be input to alter control of the motor.

2. A body massager according to claim 1, further comprising a socket for connecting, in use, the massager to a computer.
3. A body massager according to claim 2, wherein the socket is a USB socket.
4. A body massager according to any preceding claim, further comprising means for overriding, in use, the operation of the microprocessor.
5. A body massager according to any preceding claim, wherein the motor (8) drives rotation of the massage head.
6. A body massager according to any of claims 1 to 5, wherein the motor (9) drives linear motion of the massage head.
7. A body massager according to any of claims 1 to 6, wherein the motor (10) drives vibration of the massage head.
8. A system for exchanging information with a body massager, the system comprising:

a body massager according to any of claims 2 to 7;  
a computer configurable to be connected to the massager; and  
means for connecting the massager to the computer.

## Claims

1. A body massager comprising:

a housing (1);  
a massage head (3) moveable independently of the housing;  
a motor (8, 9, 10) which drives, in use, movement of the massage head;  
a microprocessor which controls the motor, in use, based upon movement data to vary at least one of the amplitude, frequency or direction of movement of the massage head; and

FIGURE 1A

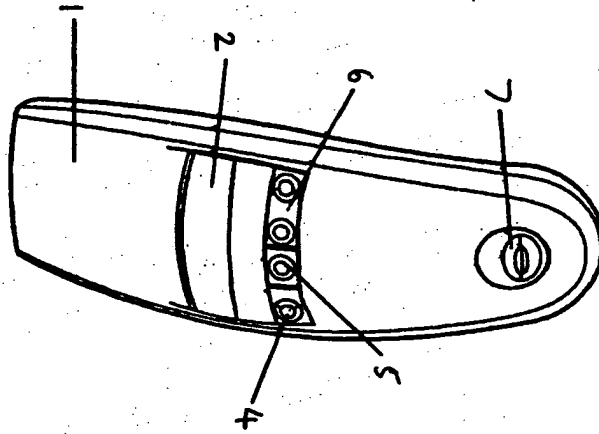


FIGURE 1B

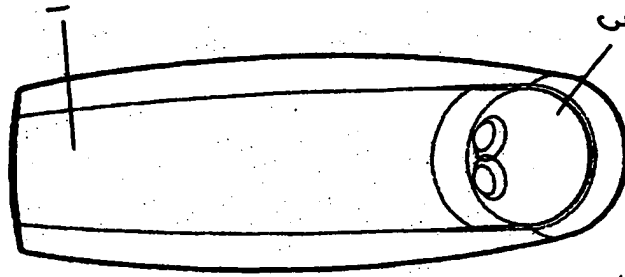


FIGURE 1C

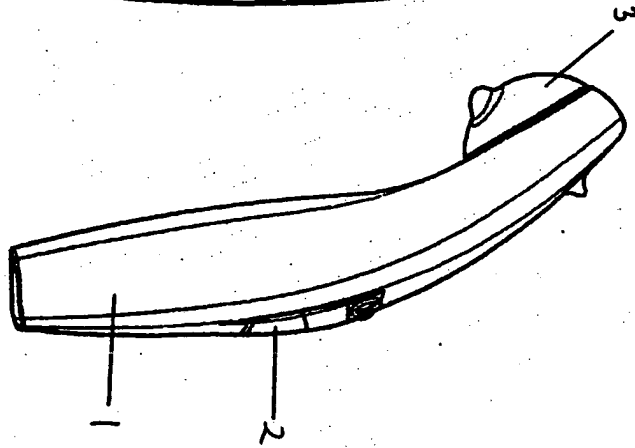


FIGURE 2B

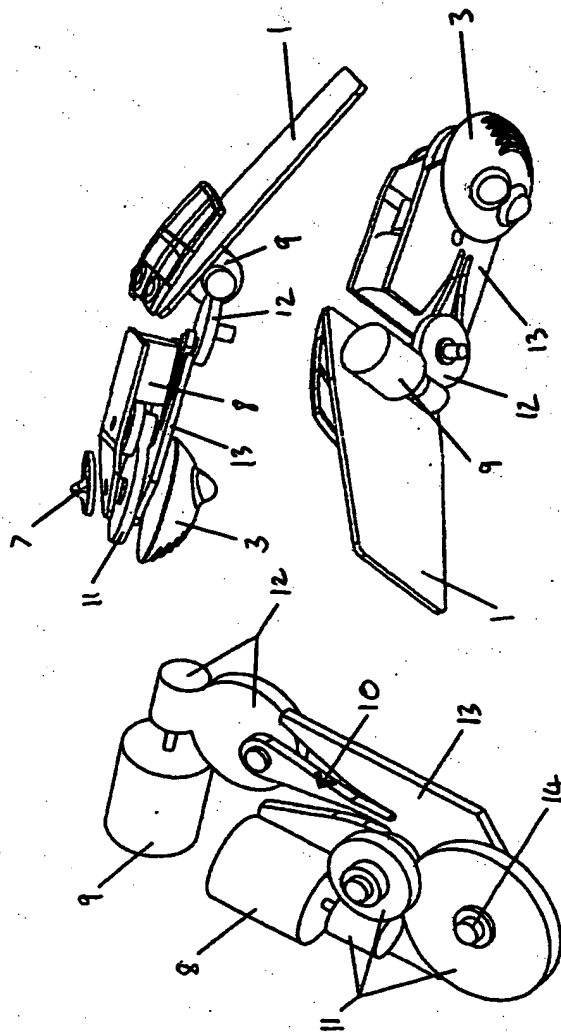


FIGURE 2C

FIGURE 2A

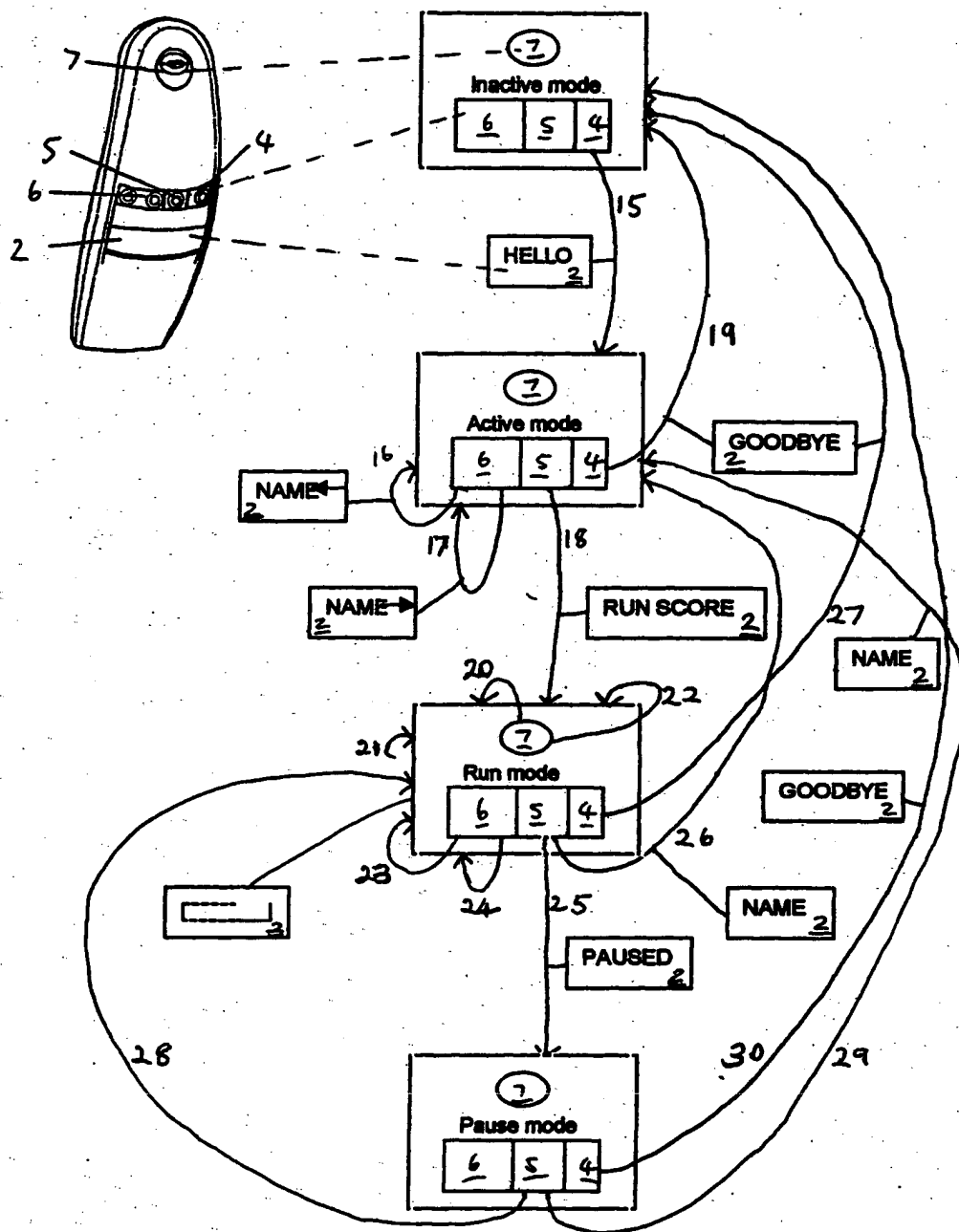


FIGURE 3



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# EUROPEAN SEARCH REPORT

Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                 |                                                    |                                                 |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                 |                                                    |                                                 |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                 | Date of completion of the search<br>18 August 2004 | Examiner<br>Oelschläger, H                      |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>.....<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                                                                                 |                                                    |                                                 |

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EPO FORM 1503 03.82 (P04C01)



**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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18-08-2004

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