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[Continued on next page]

(54) Title: WEARABLE VIBRATING MEANS AND THERMAL CONDITIONING THERAPEUTIC DEVICES

(57) Abstract: ABSTRACT OF THE DISCLOSURE A wearable therapeutic device is disclosed. The device comprises a garment accessory for fitting on the body part to be treated, vibrating means and thermal conditioning means. At least one of the means is reversibly attachable to the garment accessory. Various embodiments and methods of achieving them are disclosed, including a fastenable disposable vibrating element administering a combination of treatments to a person, wherein the element is adapted to attach at least temporarily to a brace-like sleeve and/or brace-like wearable garment accessory, the element having a plurality of attaching means. A garment accessory for the wearable therapeutic device; wherein at least one vibrating means and or heating means of the wearable therapeutic device is reversibly attachable to said garment accessory is disclosed and enabled herein.

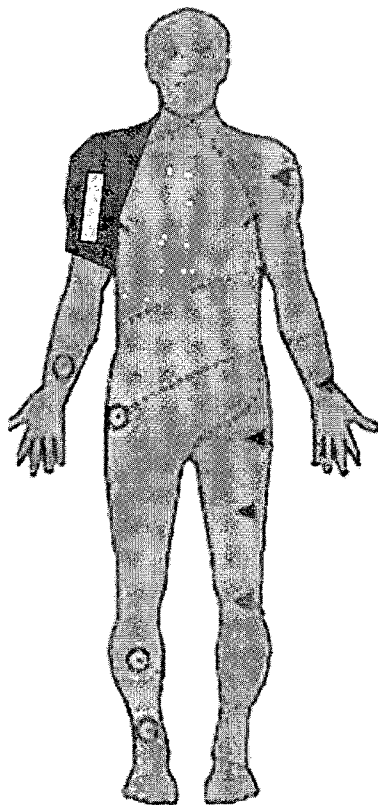


FIG. 10

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WEARABLE VIBRATING MEANS AND THERMAL CONDITIONING THERAPEUTIC DEVICES

FIELD OF THE INVENTION

The present pertains to the field of wearable vibrating means and thermal conditioning therapeutic devices. The invention also relates to therapy method for a human being by applying the said devices.

BACKGROUND OF THE INVENTION

The application of vibrational energy to affected joints can help to relieve pain and to increase mobility in affected joints. Vibration therapy also activates the proprioceptive system which has different sensors (mainly the pacinian corpuscles) that detect "joint position sense" and vibrations. Muscle spindle primary and secondary afferents and mechanoreceptors in the joint cavity generally detect joint position. Vibrations are primarily detected by pacinian corpuscles (PC) in the skin, but Merkel's disk receptors (MDR) and Meissner's corpuscles (MC) can also detect vibration. Different receptors are sensitive to different ranges of vibration frequencies. MDR's are sensitive to low frequencies at 5-15 Hz, MC's to mid-range frequencies of 20-50 Hz and PC's to high frequencies of 60-400Hz. Proprioception is reduced in arthritic joints (Koralewicz and Engh, 2000, J. Bone Jt. Surg. Am. Vol. 82, p1582). It has been observed that the most effective way to repair joints damaged by disease or injury are by inducing the joint to undergo random movements to retrain the proprioceptive system and reduce pain and joint immobility, resulting in improved quality of life for the user or patient.

"Certain components of ankle rehabilitation, such as proprioceptive exercises, have been found to protect the joint from re-injury." (Sports Med. 2003;33(15):1145-50. Prevention and treatment of ankle sprain in athletes. Osborne MD, Rizzo TD Jr. Department of Physical Medicine and Rehabilitation, Mayo Clinic, Jacksonville, Florida, USA.) Inflammation of the joint causes malpositioning and misalignment of synovia, tendons, ligaments and muscles of the joint cavity. Incorrect use of the joint as a reaction to pain only serves to reinforce and perpetuate malpositioning and misalignment, causing yet more inflammation, stress and damage.

As well as traction, Vibration therapy (VT) breaks the vicious cycle of pain and thus allows for more and better function thereby laying the basis for rehabilitation. VT activates the proprioceptive system and prevents reinjury, and may also have several effects at the

molecular level by reducing the activity of inflammatory intermediates. VT also relaxes muscles, ligaments and tendons, which are inflamed and contracted in arthritis. VT is most effective when the vibrations applied within each treatment session are varied in parameters such as frequency, duration and amplitude, and are introduced to the joints and locations in the vicinity of the joints. Such correctly administered VT improves blood and lymph flow locally, bringing new blood components to the joint capsule and removes inflammatory intermediates), resulting in improved mobility, movement, strength, balance and reduced pain and stiffness. Stimulation of mechanoreceptors in the skin by vibration results in activation of afferent pathways that activate central nervous system pathways, blocking pain-messages from getting through (gate control theory of pain). Stimulation of proprioceptors can also create an exercise effect in the muscles, which encourages the production and release of endorphins, the body's natural pain killers that also increase blood circulation.

On a world wide basis, a number of pain and discomfort control benefits have been associated with application of treatments such as heating, massage, or vibration to painful joints and limbs. US patent 5,575,761 to Hajianpour discloses a massage device.

Therapeutic devices have been proposed for a user's body parts needing heat and massage and vibratory therapy, for example US Patent 7,147,610 to Maalouf and US Patent 6,093,164 but flexibility in the ability to position and reposition the therapeutic elements so as to deliver optimal therapy is lacking.

It therefore fulfills a long felt need to provide a wearable therapeutic device comprising a garment accessory, therapeutic means and elements such as vibrating means and thermal conditioning means, so that these means are reversibly attachable to the garment accessory. The housing of all or some of these means in a convenient reversibly attachable case would fulfill another long felt need, as would the ability to place the case in a pouch which itself is reversibly attachable to the garment accessory. Another long felt need would be fulfilled if elements of these therapeutic means were disposable. A combination of treatments provided by simple devices, possibly disposable which are simply and cheaply available would fulfill a long felt need. Moreover, a long felt need still however exists for a wide range of garment accessories of wearable therapeutic devices so that they can be fitted to different body parts, and that have reversibly attachable disposable vibrating and/or heating elements, means or components which can be located on the garment accessories according to need.

SUMMARY OF THE INVENTION

It is an object of the invention to disclose a wearable therapeutic device comprising a garment accessory, vibrating means and thermal conditioning means, wherein at least one of said means is reversibly attachable to said garment accessory

It is also an object of the invention to disclose the device as defined above, wherein both said means are reversibly attachable to said garment accessory.

It is also an object of the invention to disclose the device as defined above, wherein at least one of said means is disposable.

It is also an object of the invention to disclose the device as defined above, wherein at least a portion of said garment accessory is disposable.

It is also an object of the invention to disclose the device as defined above, wherein said garment accessory is a brace-like sleeve.

It is also an object of the invention to disclose the device as defined above, wherein at least one of said means is housed in a case, said case reversibly attachable to said garment accessory.

It is also an object of the invention to disclose the device as defined above, wherein said case comprises one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means, said controlling means adapted to be operated by a person selected from a group consisting of patient, physician or therapist.

It is also an object of the invention to disclose the device as defined above, wherein said case is accommodated within a pouch.

It is also an object of the invention to disclose the device as defined above, wherein said pouch is reversibly attachable to said garment accessory.

It is also an object of the invention to disclose the device as defined above, wherein said pouch is integrated within said garment accessory.

It is also an object of the invention to disclose the device as defined above, wherein said pouch is integrated within said garment accessory.

It is also an object of the invention to disclose the device as defined above, wherein said at least one means is accommodated within a pouch.

It is also an object of the invention to disclose the device as defined above, wherein said pouch accommodates one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means,

vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means said controlling means adapted to be operated by a person selected from a group consisting of patient, physician or therapist.

It is also an object of the invention to disclose the device as defined above, wherein said pouch is reversibly attachable to said garment accessory.

It is also an object of the invention to disclose the device as defined above, wherein said pouch is integrated within said garment accessory.

It is also an object of the invention to disclose the device as defined above, wherein said pouch is integrated within said garment accessory.

It is also an object of the invention to disclose a therapy method for a human being. The method comprises steps selected inter alia from (a) obtaining a wearable garment accessory; (b) providing at least one vibrating means; (c) obtaining at least one thermal conditioning means; (d) attaching said at least one vibrating means and at least one thermal conditioning means to said wearable garment accessory thereby providing a wearable therapeutic device; (e) dressing said human being with said therapeutic device; (f) operating said at least one vibrating means and/or at least one thermal conditioning sequentially or contemporaneously.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of reversibly attaching said means to said garment accessory.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of providing at least one disposable vibrating means and/or thermal conditioning means.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of providing at least a portion of said garment accessory that is disposable.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of providing said garment accessory in brace-like sleeve form.

It is also an object of the invention to disclose the method as defined above, additionally comprising the steps of:

- (a) housing at least one of said means in a case; and,
- (b) reversibly attaching said case to said garment accessory.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of providing said case comprising one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially

ON/OFF switching means vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means and operating said controlling means by patient, physician or therapist.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of accommodating said case within a pouch.

It is also an object of the invention to disclose the method as defined above, additionally comprising the steps of providing a reversibly attachable pouch and reversibly attaching said pouch to said garment accessory.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of integrating said pouch within said garment accessory.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of accommodating said at least one means within a pouch.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of accommodating one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means within said pouch and operating said controlling means by patient, physician or therapist.

It is also an object of the invention to disclose the method as defined above, additionally comprising the steps of:

- (i) obtaining a reversibly attachable pouch; and
- (ii) reversibly attaching said pouch to said garment accessory.

It is also an object of the invention to disclose the method as defined above, additionally comprising the step of integrating said pouch within said garment accessory.

It is one object of the invention to disclose a fastenable disposable vibrating element administering a combination of treatments to a person; wherein said element is adapted to attach at least temporarily to a brace-like sleeve and/or brace-like wearable garment accessory, said element having a plurality of attaching means.

It is another object of the invention to disclose a fastenable disposable vibrating element administering a combination of treatments to a person; wherein said fastenable vibrating element is re-locatable to any position on said brace-like sleeve and/or brace-like wearable garment accessory by said patient from time to time during treatment session; said relocation determined by patient need.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element further comprises additional treatment means and/or sensing means, said additional treatment means and/or sensing means operable contemporaneously or in sequence with operation of said vibrating element.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises heating means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said heating means is replenishable.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises cooling means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises non-invasive transcutaneous (TENS) electrical nerve stimulating means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises surface electromyography sensing means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises electrical impedance sensing means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises data logging means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises skin conductivity detection means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises pulse detection means.

It is another object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally contains means selected from a group consisting of; means for applying sustained release medicaments, lubricants, salves, balms, topical therapeutic agents, analgesic agents non-steroidal anti-inflammatory drugs such as COX-2 inhibitors (especially ViOXX™ and Celebrex™) corticosteroids non-steroidal anti-inflammatory drugs (NSAIDs) or any combination thereof.

It is another object of the invention to disclose a method of administering a combination of treatments to a person; wherein said method comprises steps selected inter alia from (i)

obtaining a fastenable disposable vibrating element; (ii) providing said element with a plurality of attaching means; (iii) attaching said element at least temporarily to a brace-like sleeve and/or brace-like wearable garment accessory and administering said treatments.

It is another object of the invention to disclose a method of administering a combination of treatments to a person; wherein said method comprises steps selected inter alia from (i) obtaining a relocatable fastenable vibrating element; (ii) relocating said fastenable vibrating element to any position on a brace-like sleeve and/or brace-like wearable garment accessory from time to time during treatment session; (iii) determining relocation by patient need; (iv) controlling said determination by person, physician or therapist; and (v) administering said treatments.

It is another object of the invention to disclose the method as defined above, wherein said method additionally comprises steps of (i) obtaining said vibrating element further comprising additional treatment means and/or sensing means, said additional treatment means and/or sensing means; and (ii) operating said additional treatment means and/or sensing means contemporaneously or in sequence with operation of said vibrating element.

It is another object of the invention to disclose the method as defined above, wherein said additional treatment comprises steps of obtaining heating means and operating said heating means.

It is another object of the invention to disclose the method as defined above, additionally comprising the steps of obtaining cooling means and operating said cooling means.

It is another object of the invention to disclose the method as defined above, additionally comprising the steps of obtaining non-invasive transcutaneous (TENS) electrical nerve stimulating means and operating said TENS means.

It is another object of the invention to disclose the method as defined above, additionally comprising the steps of obtaining surface electromyography sensing (SEMS) means and operating said SEMS means.

It is another object of the invention to disclose the method as defined above, additionally comprising the steps of obtaining electrical impedance sensing means and operating said electrical impedance sensing means.

It is another object of the invention to disclose the method as defined above, additionally comprising the steps of obtaining data logging means and operating said data logging means.

It is another object of the invention to disclose the method as defined above, additionally comprising the steps of obtaining skin conductivity detection means and operating skin conductivity means.

It is still an object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally comprises pulse detection means.

It is lastly an object of the invention to disclose the fastenable disposable vibrating element as defined above, wherein said vibrating element additionally contains means selected from a group consisting of; means for applying sustained release medicaments, lubricants, salves, balms, topical therapeutic agents, analgesic agents non-steroidal anti-inflammatory drugs such as COX-2 inhibitors (especially ViOXX™ and Celebrex™) corticosteroids non-steroidal anti-inflammatory dugs (NSAIDs) or any combination thereof.

It is one object of the present invention to disclose a garment accessory for a wearable therapeutic device wherein at least one vibrating means and or heating means of said wearable therapeutic device is reversibly attachable to said garment accessory.

It is another object of the present invention to provide a garment accessory for a reversibly attachable disposable wearable vibrating and/or heating therapeutic device wherein said garment accessory is a brace-like sleeve.

It is another object of the present invention to provide the garment accessory as defined above, further comprising said garment accessory adapted to fit an elbow.

It is another object of the present invention to the provide garment accessory as defined above, further comprising said garment accessory adapted to fit a knee.

It is another object of the present invention to provide the garment accessory as defined above, further comprising said garment accessory adapted to fit a shoulder.

It is another object of the present invention to provide the garment accessory as defined above, further comprising said garment accessory adapted to fit a wrist.

It is another object of the present invention to provide the garment accessory as defined above, further comprising said garment accessory adapted to fit a hand.

It is another object of the present invention to provide the garment accessory as defined above, further comprising said garment accessory adapted to fit a back or portion of a back.

It is another object of the present invention to provide the garment accessory as defined above, further comprising said garment accessory adapted to fit a neck.

It is another object of the present invention to provide the garment accessory as defined above, further comprising said garment accessory adapted to fit a hip.

It is another object of the present invention to provide a method of applying a garment accessory to a wearable therapeutic device. Wherein said method comprises steps selected inter alia from (i) obtaining at least one garment accessory; (ii) providing at least one vibrating means and/or heating means; (iii) adapting said at least one vibrating means and/or

heating means; (iv) reversibly attaching said at least one vibrating means and/or heating means to said garment accessory.

It is another object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, wherein said method comprises a step of reversibly attaching said at least one vibrating means and/or heating means to a brace-like sleeve.

It is another object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, additionally comprising the step of adapting said garment accessory to fit an elbow.

It is another object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, additionally comprising the step of adapting said garment accessory to fit a knee.

It is another object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, additionally comprising the step of adapting said garment accessory to fit a shoulder.

It is another object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, additionally comprising the step of adapting said garment accessory to fit a wrist.

It is another object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, additionally comprising the step of adapting said garment accessory to fit a hand.

It is still an object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, additionally comprising the step of adapting said garment accessory to fit a back or portions of a back.

It is lastly an object of the present invention to provide the method of applying a garment accessory to a wearable therapeutic device as defined above, additionally comprising the step of adapting said garment accessory to fit a hip.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention and to see how it may be implemented in practice, a plurality of embodiments is adapted to now be described, by way of non-limiting example only, with reference to the accompanying drawings,

In the drawings:

Figure 1 schematically illustrates a wearable therapeutic device according to one embodiment of the invention;

Figure 2 schematically illustrates another aspect of the device according to one embodiment of the invention.

Figures 3a – 3c schematically illustrate another aspect of the device according to one embodiment of the invention.

Figure 4 schematically illustrates another aspect of the device according to one embodiment of the invention.

Figure 5 schematically illustrates a possible embodiment of the present invention

Figure 6 schematically illustrates a possible embodiment of the present invention

Figure 7 schematically illustrates a possible embodiment of the present invention.

Figure 8 schematically illustrates an aspect of the invention.

Figure 9 schematically illustrates another aspect of the invention.

Figure 10 schematically illustrates another aspect of the invention.

Figure 11 schematically illustrates another aspect of the invention.

Figure 12 schematically illustrates another aspect of the invention.

DETAILED DESCRIPTION OF THE INVENTION

The following description is provided, alongside all chapters of the present invention, so as to enable any person skilled in the art to make use of said invention and sets forth the best modes contemplated by the inventor of carrying out this invention. Various modifications, however, are adapted to remain apparent to those skilled in the art, since the generic principles of the present invention have been defined specifically to provide wearable vibrating means and thermal conditioning therapeutic devices and therapy method for a human being by applying the devices. The invention is herein described, by way of example only, with reference to the accompanying drawings.

The term garment accessory hereinafter refers to a covering snugly fitting the body part to be treated. In some embodiments the aforementioned garment accessory may be semi rigid and brace-like or sleeve-like. In some embodiments the aforementioned garment accessory may be bandage, binding or wrapping like. In some embodiments the garment accessory may be preformed, whereas in other embodiments the garment accessory may be constructed of such materials as to enable shaping of the accessory to the individual body part of the patient. It is envisaged that the reversible attachability of any of the elements, means or components of the

invention is effected through attaching means selected from a group consisting of magnets, screws, hooks, zips, fasteners, clips, flaps, clasps, springs, grips, hooks-and-loops (especially VelcroTM-type fasteners), hooks, hooks and eyes, straps, strings, wires, cables, tabs, links, poppers, nails, buttons, brackets, buckles or any combination thereof.

Reference is now made to fig 1, illustrating a wearable therapeutic device showing the garment accessory (for the knee joint, in this case) in one possible embodiment of the invention. 42A, 42B form a reversible, optionally unique closure with 42D and 43D. 42C, 43C closes with 43B and 42 B likewise. 41 is a kneehole, and 41 A,B,C and D are sites for reversible attachment locations of the vibrating and other treatment means, which can be placed according to patient need. The wearable therapeutic device shown in fig. 2 illustrates another possible embodiment of the invention comprising a garment accessory, with vibrating means and thermal conditioning means reversibly attached to one of the several possible locations and orientations on the garment accessory. The light stippled strips represent a few of the many reversible attachment means on the garment, and the black bordered rectangle illustrates one of the many positions where the optionally disposable vibrating and or other treatment means can be located according to patient need. At least one of the means is reversibly attachable to the garment accessory.

Reference is now made to fig. 3 schematically illustrating some possible embodiments of aspects of the invention; fig. 3a illustrates a vibrating and heating means, fig. 3b illustrates similar means housed in a case, and fig. 3c illustrates a case housing vibrating or other treatment means contained in a pouch.

Reference is now made to fig. 4 which is a cut-away graphical representation of a possible embodiment of the invention, illustrating a vibrator which can be reversibly attached to a garment accessory.

Reference is now made to the device as defined above in which both the means are reversibly attachable to the garment accessory.

Reference is now made to the device as defined above in which at least one of the means is disposable.

Reference is now made to the device as defined above in which at least a portion of the garment accessory is disposable.

Reference is now made to the device as defined above in which the garment accessory is a brace-like sleeve.

Reference is now made to the device as defined above in which at least one of the means is housed in a case, the case reversibly attachable to the garment accessory.

Reference is now made to the device as defined above in which the case comprises one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means, the controlling means adapted to be operated by a person selected from a group consisting of patient, physician or therapist.

Reference is now made to the device as defined above in which the case is accommodated within a pouch.

Reference is now made to the device as defined above in which the pouch is reversibly attachable to the garment accessory.

Reference is now made to the device as defined above in which the pouch is integrated within the garment accessory.

Reference is now made to the device as defined above in which the pouch is integrated within the garment accessory.

Reference is now made to the device as defined above in which at least one means is accommodated within a pouch.

Reference is now made to the device as defined above in which the pouch accommodates one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means the controlling means adapted to be operated by a person selected from a group consisting of patient, physician or therapist.

Reference is now made to the device as defined above in which the pouch is reversibly attachable to the garment accessory.

Reference is now made to the device as defined above in which the pouch is integrated within the garment accessory.

Reference is now made to the device as defined above in which the pouch is integrated within the garment accessory.

Reference is now made to a therapy method for a human being. The method comprises steps selected inter alia from (a) obtaining a wearable garment accessory; (b) providing at least one vibrating means; (c) obtaining at least one thermal conditioning means; (d) attaching at least one vibrating means and at least one thermal conditioning means to the wearable garment

accessory thereby providing a wearable therapeutic device; (e) dressing the human being with the therapeutic device; and (f) operating at least one vibrating means and/or at least one thermal conditioning sequentially or contemporaneously.

Reference is now made to the method as defined above additionally comprising the step of reversibly attaching the means to the garment accessory.

Reference is now made to the method as defined above additionally comprising the step of providing at least one disposable vibrating means and/or thermal conditioning means.

Reference is now made to the method as defined above additionally comprising the step of providing at least a portion of the garment accessory that is disposable.

Reference is now made to the method as defined above additionally comprising the step of providing the garment accessory in brace-like sleeve form.

Reference is now made to the method as defined above additionally comprising the steps of:

- (a) housing at least one of the means in a case; and,
- (b) reversibly attaching the case to the garment accessory.

Reference is now made to the method as defined above additionally comprising the step of providing the case comprising one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means and operating the controlling means by patient, physician or therapist.

Reference is now made to the method as defined above additionally comprising the step of accommodating the case within a pouch.

Reference is now made to the method as defined above additionally comprising the steps of providing a reversibly attachable pouch and reversibly attaching the pouch to the garment accessory.

Reference is now made to the method as defined above additionally comprising the step of integrating the pouch within the garment accessory.

Reference is now made to the method as defined above additionally comprising the step of integrating the pouch within the garment accessory.

Reference is now made to the method as defined above additionally comprising the step of accommodating the at least one means within a pouch.

Reference is now made to the method as defined above additionally comprising the step of accommodating one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating

frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means within the pouch and operating the controlling means by patient, physician or therapist.

Reference is now made to the method as defined above additionally comprising the steps of:

- (i) obtaining a reversibly attachable pouch; and
- (ii) reversibly attaching the pouch to the garment accessory.

Reference is now made to the method as defined above additionally comprising the step of integrating the pouch within the garment accessory.

Reference is now made to the method as defined above additionally comprising the step of integrating the pouch within the garment accessory.

The present invention provides a fastenable disposable vibrating element administering a combination of treatments to a person. The element is adapted to attach at least temporarily to a brace-like sleeve and/or brace-like wearable garment accessory, the element having a plurality of attaching means.

The present invention also provides a fastenable disposable vibrating element administering a combination of treatments to a person. The fastenable vibrating element is re-locatable to any position on the brace-like sleeve and/or brace-like wearable garment accessory by the patient from time to time during treatment session; the relocation determined by patient need.

According to one embodiment of the present invention, the vibrating element of the further comprises additional treatment means and/or sensing means, the additional treatment means and/or sensing means operable contemporaneously or in sequence with operation of the vibrating element.

According to another embodiment of the present invention, the vibrating element additionally comprises heating means.

According to another embodiment of the present invention, the heating means of the fastenable disposable vibrating element is replenishable.

According to another embodiment of the present invention, the vibrating element additionally comprises cooling means.

According to another embodiment of the present invention, the vibrating element additionally comprises non-invasive transcutaneous (TENS) electrical nerve stimulating means.

According to another embodiment of the present invention, the vibrating element additionally comprises surface electromyography sensing means.

According to another embodiment of the present invention, the vibrating element additionally comprises electrical impedance sensing means.

According to another embodiment of the present invention, the vibrating element additionally comprises data logging means.

According to another embodiment of the present invention, the vibrating element additionally comprises skin conductivity detection means.

According to another embodiment of the present invention, the vibrating element additionally comprises pulse detection means.

According to another embodiment of the present invention, the vibrating element additionally contains means selected from a group comprising of: means for applying sustained release medicaments, lubricants, salves, balms, topical therapeutic agents, analgesic agents non-steroidal anti-inflammatory drugs such as COX-2 inhibitors (especially ViOXX™ and Celebrex™) corticosteroids non-steroidal anti-inflammatory dugs (NSAIDs) or any combination thereof.

According to another embodiment of the present invention, the vibrating element additionally comprises pulse detection means.

According to another embodiment of the present invention, the vibrating element additionally contains means selected from a group comprising of: means for applying sustained release medicaments, lubricants, salves, balms, topical therapeutic agents, analgesic agents non-steroidal anti-inflammatory drugs such as COX-2 inhibitors (especially ViOXX™ and Celebrex™) corticosteroids non-steroidal anti-inflammatory dugs (NSAIDs) or any combination thereof.

The present invention provides also provides a method of administering a combination of treatments to a person. The method comprises steps selected inter alia from (i) obtaining a fastenable disposable vibrating element; (ii) providing the element with a plurality of attaching means; and (iii) attaching the element at least temporarily to a brace-like sleeve and/or brace-like wearable garment accessory and administering the treatments.

The present invention provides also provides a method of administering a combination of treatments to a person. The method comprises steps selected inter alia from (i) obtaining a relocatable fastenable vibrating element; (ii) relocating the fastenable vibrating element to any position on a brace-like sleeve and/or brace-like wearable garment accessory from time to time during treatment session; (iii) determining relocation by patient need; (iv) controlling the determination by person, physician or therapist; and, (v) administering the treatments.

According to another embodiment of the present invention, the method as defined above, additionally comprising the steps of:

1. obtaining the vibrating element further comprising additional treatment means and/or sensing means, the additional treatment means and/or sensing means; and
2. operating the additional treatment means and/or sensing means contemporaneously or in sequence with operation of the vibrating element.

According to yet another embodiment of the present invention, the method as defined above, additionally comprising the steps of obtaining heating means and operating the heating means.

According to yet another embodiment of the present invention, the method as defined above, additionally comprising the steps of obtaining cooling means and operating the cooling means.

According to yet another embodiment of the present invention, the method as defined above, additionally comprising the steps of obtaining non-invasive transcutaneous (TENS) electrical nerve stimulating means and operating the TENS means.

According to yet another embodiment of the present invention, the method as defined above, additionally comprising the steps of obtaining surface electromyography sensing (SEMS) means and operating the SEMS means.

According to yet another embodiment of the present invention, the method as defined above, additionally comprising the steps of obtaining electrical impedance sensing means and operating the electrical impedance sensing means.

According to yet another embodiment of the present invention, the method as defined above, additionally comprising the steps of obtaining data logging means and operating the data logging means.

According to yet another embodiment of the present invention, the method as defined above, additionally comprising the steps of obtaining skin conductivity detection means and operating skin conductivity means.

Reference is now made to fig. 5 schematically illustrating an embodiment of the invention such that the vibrating element additionally comprises heating means. The wavy lines signify vibrations emanating from the vibrating means portion of the element. The concentric circles signify heat emanating from the heating means portion of the element.

Reference is now made to Figs. 6, 7 and 8 schematically illustrating an embodiment of the invention such that the vibrating element additionally comprises heating means and the

heating means is replenishable. The wavy lines signify vibrations emanating from the vibrating means portion of the element. The stippled pattern signify replenishable heating material from the heating means portion of the element.

Reference is now made to fig. 9 schematically illustrating an embodiment of the invention such that the vibrating element additionally comprises a pulse sensing and data logging device. It is envisaged that other sensors and means of treatment may be embodied, and that the whole element or parts of it may be disposable. The illustrations given are exemplary of the possible embodiments of the invention.

The present invention provides a garment accessory for a wearable therapeutic device. At least one vibrating means and or heating means of the wearable therapeutic device is reversibly attachable to the garment accessory.

The present invention additionally provides a garment accessory for a reversibly attachable disposable wearable vibrating and/or heating therapeutic device. The garment accessory is a brace-like sleeve.

Reference is now made to one embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit an elbow.

Reference is now made to another embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit a knee.

Reference is now made to another embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit a shoulder.

Reference is now made to another embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit a wrist.

Reference is now made to another embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit a hand.

Reference is now made to another embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit a back or portion of a back.

Reference is now made to another embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit a neck.

Reference is now made to another embodiment of the present invention. According to this embodiment, the garment accessory as defined above adapted to fit a hip.

The present invention additionally provides a method of applying a garment accessory to a wearable therapeutic device. The method comprises step selected inter alia from (i) obtaining

at least one garment accessory; (ii) providing at least one vibrating means and/or heating means; (iii) adapting the at least one vibrating means and/or heating means; (iv) reversibly attaching the at least one vibrating means and/or heating means to the garment accessory.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises a step of reversibly attaching the at least one vibrating means and/or heating means to a brace-like sleeve.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises the step of adapting the garment accessory to fit an elbow.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises the step of adapting the garment accessory to fit a knee.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises the step of adapting the garment accessory to fit a shoulder.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises the step of adapting the garment accessory to fit a wrist.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises the step of adapting the garment accessory to fit a hand.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises the step of adapting the garment accessory to fit a back or portions of a back.

Reference is now made to another embodiment of the present invention. According to this embodiment, the method as defined above additionally comprises the step of adapting the garment accessory to fit a hip.

Reference is now made to figs. 10, 11 and 12 of the invention, schematically illustrating possible embodiments of the present invention as described. It should be noted that the garment accessory is envisaged to be semi-rigid, and/or brace-like and/or bandage like according to the utility of the chosen embodiment. The light strip in the illustrations, where shown, refers to reversibly attachable at least one vibrating means and/or heating means or other treatment means attached to the garment accessory. The stippling on the garment accessory in Figs 10, 11 and 12 refers to the universal reversible attachability of the

aforementioned means. It is acknowledged that there are many other embodiments of the garment accessory possible, and the references herein are exemplary and non limiting.

CLAIMS:

1. A wearable therapeutic device comprising a garment accessory, vibrating means and thermal conditioning means, wherein at least one of said means is reversibly attachable to said garment accessory.
2. The device according to claim 1, wherein both said means are reversibly attachable to said garment accessory.
3. The device according to claim 1, wherein at least one of said means is disposable.
4. The device according to claim 1, wherein at least a portion of said garment accessory is disposable.
5. The device according to claim 1, wherein said garment accessory is a brace-like sleeve.
6. The device according to claim 1, wherein at least one of said means is housed in a case, said case reversibly attachable to said garment accessory.
7. The device according to claim 6, wherein said case comprises one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means, said controlling means adapted to be operated by a person selected from a group consisting of patient, physician or therapist.
8. The device according to claim 6, wherein said case is accommodated within a pouch.
9. The device according to claim 8, wherein said pouch is reversibly attachable to said garment accessory.
10. The device according to claim 8, wherein said pouch is integrated within said garment accessory.
11. The device according to claim 9, wherein said pouch is integrated within said garment accessory.
12. The device according to claim 1, wherein said at least one means is accommodated within a pouch.
13. The device according to claim 8, wherein said pouch accommodates one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means said controlling means adapted to be operated by a person selected from a group consisting of patient, physician or therapist.

14. The device according to claim 13, wherein said pouch is reversibly attachable to said garment accessory.
15. The device according to claim 9, wherein said pouch is integrated within said garment accessory.
16. The device according to claim 10, wherein said pouch is integrated within said garment accessory.
17. A fastenable disposable vibrating element administering a combination of treatments to a person, wherein said element is adapted to attach at least temporarily to a brace-like sleeve and/or brace-like wearable garment accessory, said element having a plurality of attaching means.
18. A fastenable disposable vibrating element administering a combination of treatments to a person, wherein said fastenable vibrating element is re-locatable to any position on said brace-like sleeve and/or brace-like wearable garment accessory by said patient from time to time during treatment session; said relocation determined by patient need.
19. The fastenable disposable vibrating element of claim 17, wherein said vibrating element further comprises additional treatment means and/or sensing means, said additional treatment means and/or sensing means operable contemporaneously or in sequence with operation of said vibrating element.
20. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises heating means.
21. The fastenable disposable vibrating element of claim 20, wherein said heating means is replenishable.
22. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises cooling means.
23. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises non-invasive transcutaneous (TENS) electrical nerve stimulating means.
24. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises surface electromyography sensing means.
25. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises electrical impedance sensing means.
26. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises data logging means.

27. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises skin conductivity detection means.
28. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally comprises pulse detection means.
29. The fastenable disposable vibrating element of claim 17, wherein said vibrating element additionally contains means selected from a group comprising of; means for applying sustained release medicaments, lubricants, salves, balms, topical therapeutic agents, analgesic agents non-steroidal anti-inflammatory drugs such as COX-2 inhibitors (especially ViOXX™ and Celebrex™) corticosteroids non-steroidal anti-inflammatory drugs (NSAIDs) or any combination thereof.
30. A garment accessory for a wearable therapeutic device; wherein at least one vibrating means and or heating means of said wearable therapeutic device is reversibly attachable to said garment accessory.
31. A garment accessory for a reversibly attachable disposable wearable vibrating and/or heating therapeutic device; wherein said garment accessory is a brace-like sleeve.
32. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit an elbow.
33. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit a knee.
34. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit a shoulder.
35. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit a wrist.
36. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit a hand.
37. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit a back or portion of a back.
38. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit a neck.
39. The device according to claims 31 or 32, further comprising said garment accessory adapted to fit a hip.
40. A therapy method for a human being; said method comprising the steps of:
 - (a) obtaining a wearable garment accessory;
 - (b) providing at least one vibrating means;

- (c) obtaining at least one thermal conditioning means;
 - (d) attaching said at least one vibrating means and at least one thermal conditioning means to said wearable garment accessory thereby providing a wearable therapeutic device;
 - (e) dressing said human being with said therapeutic device;
 - (f) operating said at least one vibrating means and/or at least one thermal conditioning sequentially or contemporaneously.
41. The therapy method according to claim 40, additionally comprising the step of reversibly attaching said means to said garment accessory.
42. The therapy method according to claim according to claim 40, additionally comprising the step of providing at least one disposable vibrating means and/or thermal conditioning means.
43. The therapy method according to claim according to claim 40, additionally comprising the step of providing at least a portion of said garment accessory that is disposable.
44. The therapy method according to claim according to claim 40, additionally comprising the step of providing said garment accessory in brace-like sleeve form.
45. The therapy method according to claim according to claim 40, additionally comprising the steps of:
- (c) housing at least one of said means in a case; and,
 - (d) reversibly attaching said case to said garment accessory.
46. The therapy method according to claim according to claim 45, additionally comprising the step of providing said case comprising one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means and operating said controlling means by patient, physician or therapist.
47. The therapy method according to claim according to claim 23, additionally comprising the step of accommodating said case within a pouch.
48. The therapy method according to claim according to claim 24, additionally comprising the steps of providing a reversibly attachable pouch and reversibly attaching said pouch to said garment accessory.
49. The therapy method according to either claims 21 or 22, additionally comprising the step of integrating said pouch within said garment accessory.

50. The therapy method according to claim 17, additionally comprising the step of accommodating said at least one means within a pouch.
51. The therapy method according to claim 27, additionally comprising the step of accommodating one or more of a group consisting of power supply, vibrating means, thermal conditioning means, controlling means (especially ON/OFF switching means, vibrating frequency controlling means and vibrating amplitude controlling means), monitoring means, rheostat control means and data logging means within said pouch and operating said controlling means by patient, physician or therapist.
52. The therapy method according to claim 28, additionally comprising the steps of:
- (iii) obtaining a reversibly attachable pouch; and
 - (iv) reversibly attaching said pouch to said garment accessory.
53. The therapy method according to either of claims 22 or 23, additionally comprising the step of integrating said pouch within said garment accessory.
54. A method of administering a combination of treatments to a person wherein said method comprises steps of
- a. obtaining a fastenable disposable vibrating element;
 - b. providing said element with a plurality of attaching means; and
 - c. attaching said element at least temporarily to a brace-like sleeve and/or brace-like wearable garment accessory and administering said treatments.
55. A method of administering a combination of treatments to a person wherein said method comprises steps of
- a. obtaining a relocatable fastenable vibrating element;
 - b. relocating said fastenable vibrating element to any position on a brace-like sleeve and/or brace-like wearable garment accessory from time to time during treatment session;
 - c. determining relocation by patient need;
 - d. controlling said determination by person, physician or therapist; and,
 - e. administering said treatments.
56. A method of administering a combination of treatments to a person according to claim 14, additionally comprising the steps of:
- a. obtaining said vibrating element further comprising additional treatment means and/or sensing means, said additional treatment means and/or sensing means; and
 - b. operating said additional treatment means and/or sensing means contemporaneously or in sequence with operation of said vibrating element.

57. A method of administering a combination of treatments to a person according to claim 16, additionally comprising the steps of obtaining heating means and operating said heating means.
58. A method of administering a combination of treatments to a person according to claim 16, additionally comprising the steps of obtaining cooling means and operating said cooling means.
59. A method of administering a combination of treatments to a person according to claim 16, additionally comprising the steps of obtaining non-invasive transcutaneous (TENS) electrical nerve stimulating means and operating said TENS means.
60. A method of administering a combination of treatments to a person according to claim 16, additionally comprising the steps of obtaining surface electromyography sensing (SEMS) means and operating said SEMS means.
61. A method of administering a combination of treatments to a person according to claim 16, additionally comprising the steps of obtaining electrical impedance sensing means and operating said electrical impedance sensing means.
62. A method of administering a combination of treatments to a person according to claim 16, additionally comprising the steps of obtaining data logging means and operating said data logging means.
63. A method of administering a combination of treatments to a person according to claim 16, additionally comprising the steps of obtaining skin conductivity detection means and operating skin conductivity means.
64. The fastenable disposable vibrating element of claim 1, wherein said vibrating element additionally comprises pulse detection means.
65. The fastenable disposable vibrating element of claim 1, wherein said vibrating element additionally contains means selected from a group comprising of: means for applying sustained release medicaments, lubricants, salves, balms, topical therapeutic agents, analgesic agents non-steroidal anti-inflammatory drugs such as COX-2 inhibitors (especially ViOXX™ and Celebrex™) corticosteroids non-steroidal anti-inflammatory dugs (NSAIDs) or any combination thereof.
66. A method of applying a garment accessory to a wearable therapeutic device wherein said method comprises steps of:
 - (i) obtaining at least one garment accessory;
 - (ii) providing at least one vibrating means and/or heating means;
 - (iii) adapting said at least one vibrating means and/or heating means;

(iv) reversibly attaching said at least one vibrating means and/or heating means to said garment accessory.

67. A method of applying a garment accessory to a wearable therapeutic device according to claim 11, wherein said method comprises a step of reversibly attaching said at least one vibrating means and/or heating means to a brace-like sleeve.
68. A method of applying a garment accessory to a wearable therapeutic device according to either claims 10 and 11, additionally comprising the step of adapting said garment accessory to fit an elbow.
69. A method of applying a garment accessory to a wearable therapeutic device according to either claims 10 and 11, additionally comprising the step of adapting said garment accessory to fit a knee.
70. A method of applying a garment accessory to a wearable therapeutic device according to either claims 10 and 11, additionally comprising the step of adapting said garment accessory to fit a shoulder.
71. A method of applying a garment accessory to a wearable therapeutic device according to either claims 10 and 11, additionally comprising the step of adapting said garment accessory to fit a wrist.
72. A method of applying a garment accessory to a wearable therapeutic device according to either claims 10 and 11, additionally comprising the step of adapting said garment accessory to fit a hand.
73. A method of applying a garment accessory to a wearable therapeutic device according to either claims 10 and 11, additionally comprising the step of adapting said garment accessory to fit a back or portions of a back.
74. A method of applying a garment accessory to a wearable therapeutic device according to either claims 10 and 11, additionally comprising the step of adapting said garment accessory to fit a hip.

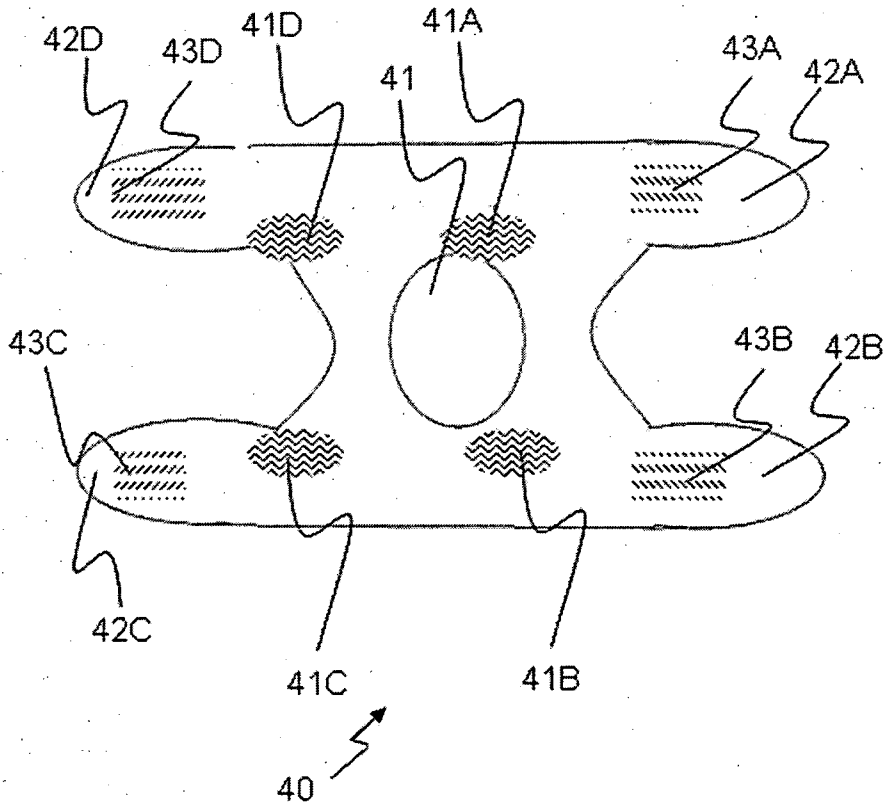


FIG. 1

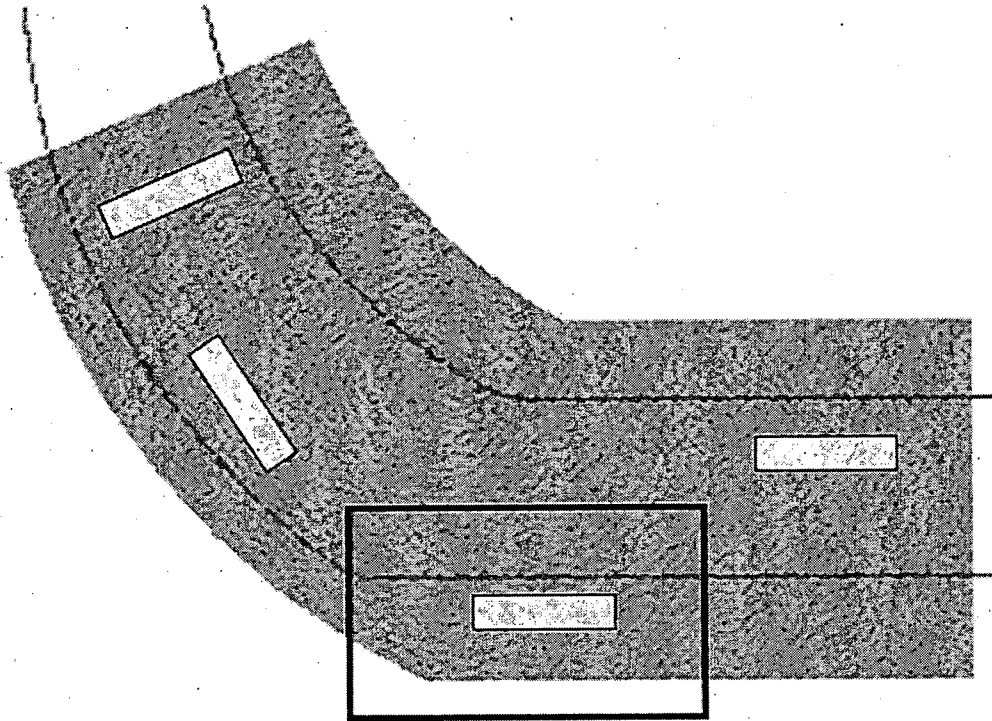


FIG. 2

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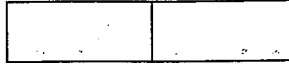


FIG. 3A

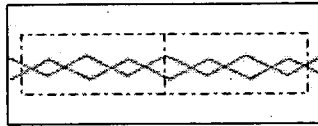


FIG. 3B

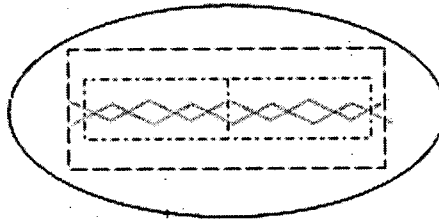


FIG. 3C

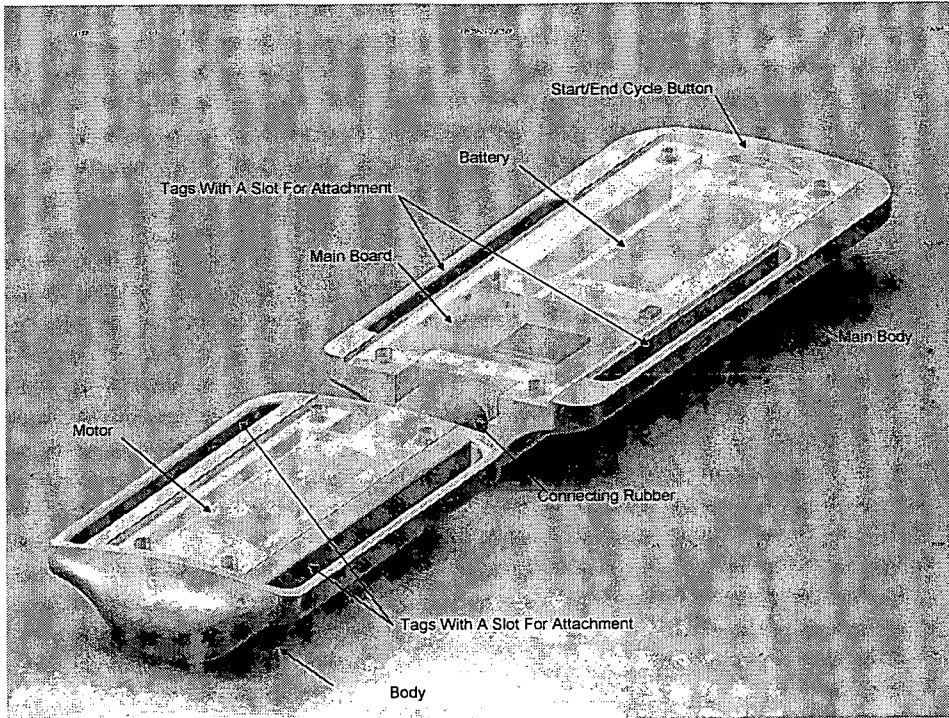


FIG. 4

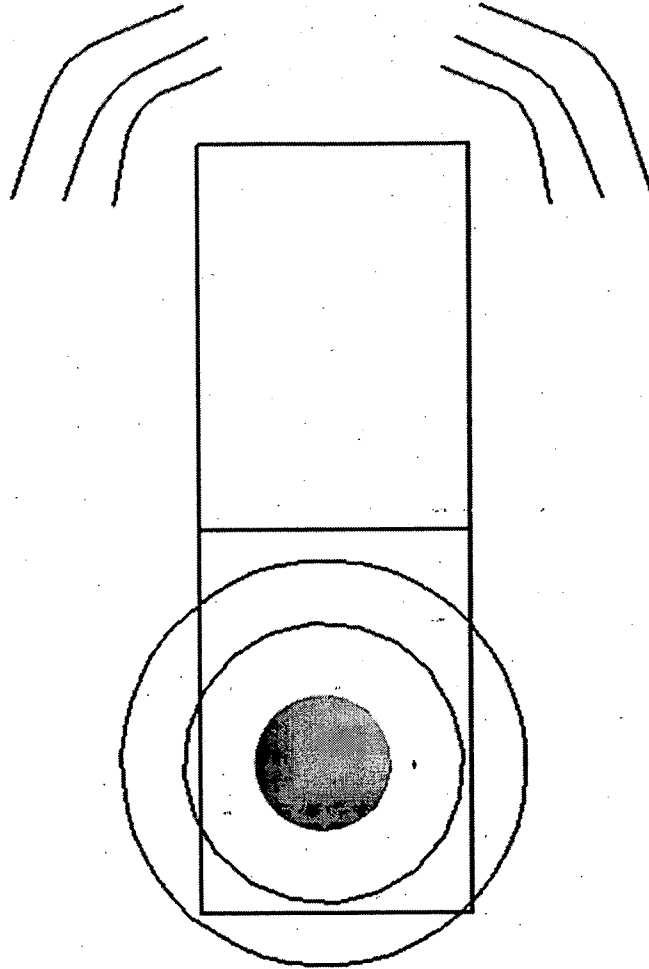


FIG. 5

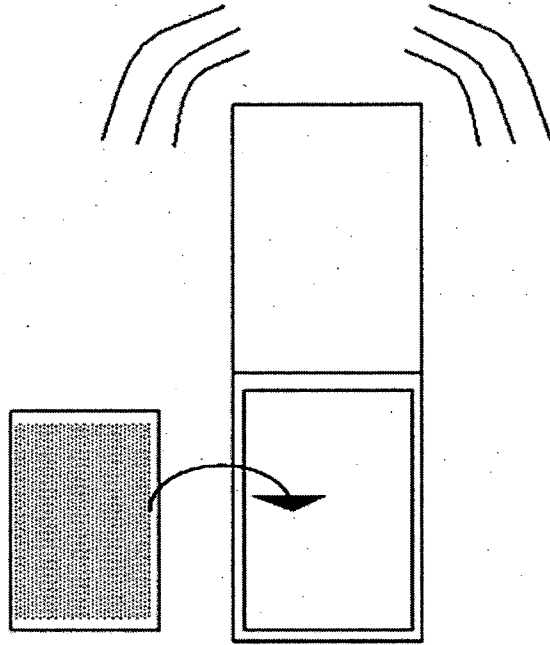


FIG. 6

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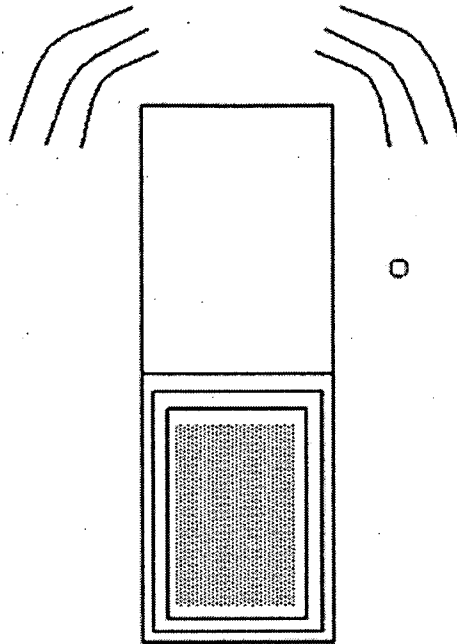


FIG. 7

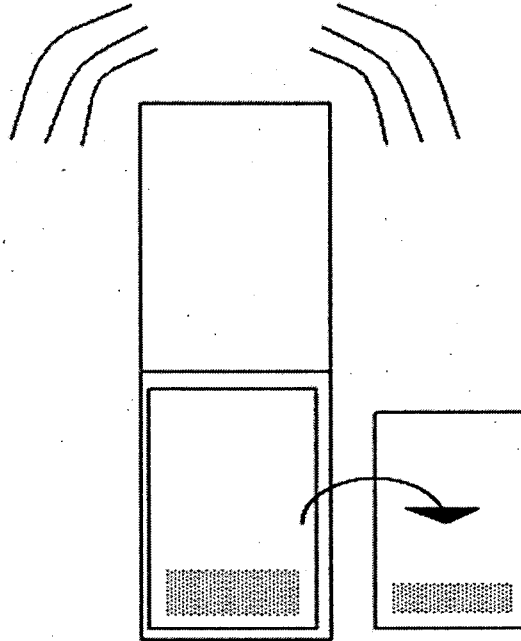


FIG. 8

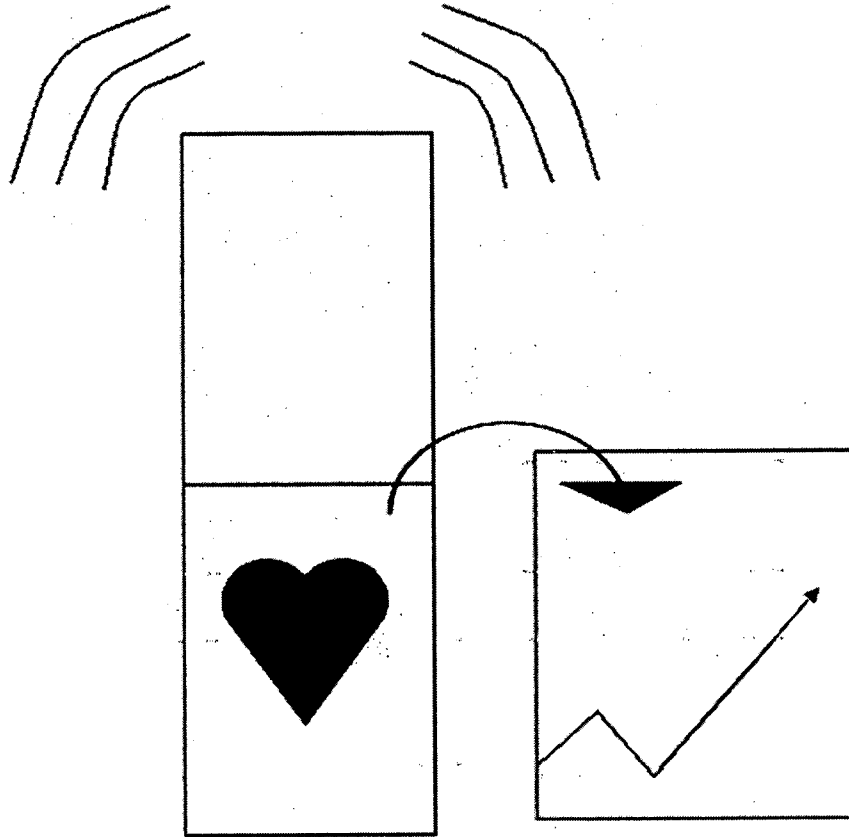


FIG. 9

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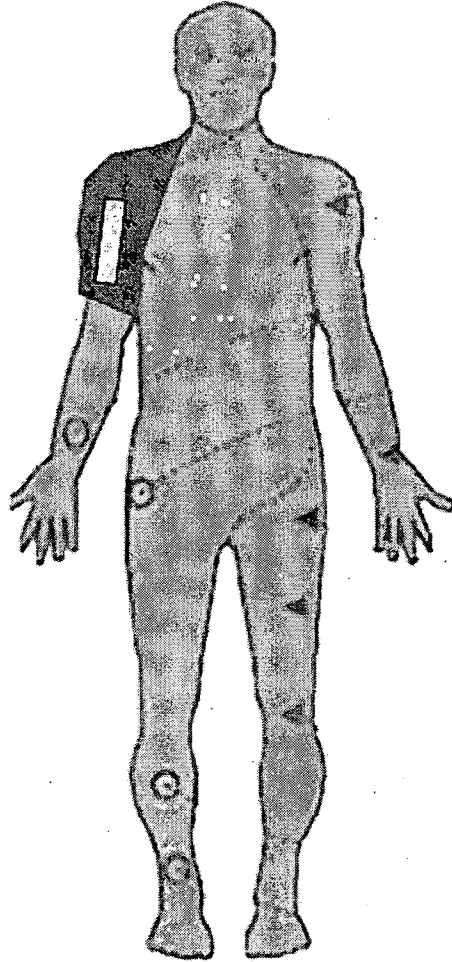


FIG. 10

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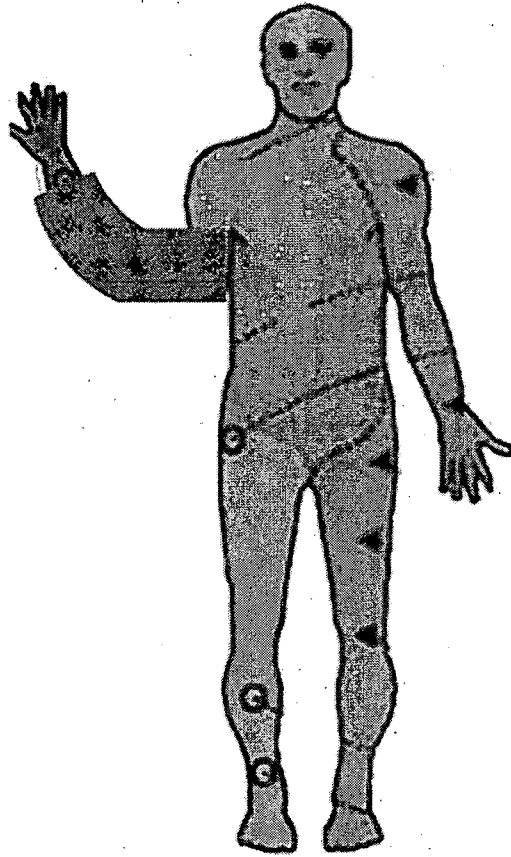


FIG. 11

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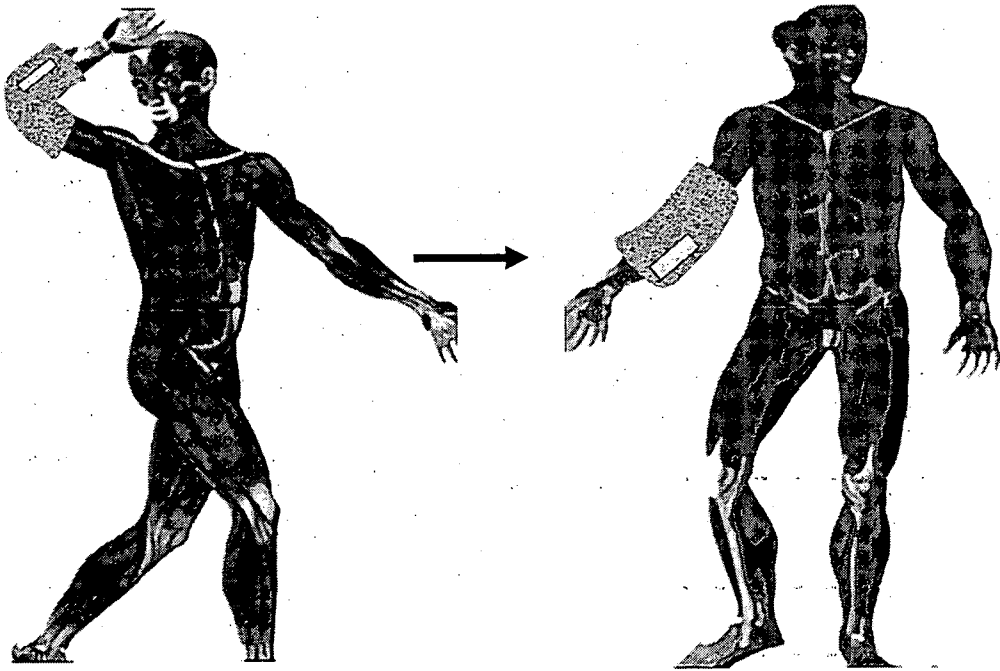


FIG. 12