specifies what the stimulation source is, what the stimulation waveform is, if the measured value is a current, if the measured value is a voltage, and if the measured value is the phase between current and voltage.

When the first bit of the diagnosis instruction word 154 is set in a high state 158, the diagnosis concerns the digital system. To input a test vector, the next bit is set to a low state and the vector 160 itself follows. If the length of the test vector is longer than 22 bits as defined by the SCL parameter in the configuration mode, the 23rd and next bits are sent in a subsequent similar diagnosis instruction word.

To read the data in a particular module of the system, both the first and second bit of the diagnosis instruction word are set in a high state 162. The controller will then send the test result back to the external unit 6.

Referring to Figure 16, the power management mode set by the command word <1,0> == 11 allows to turn any component of the system on and off. The two parameters supplied in this mode are the power management action (PA), which defines if the unit/module has to be turned on/off, and the unit/module identification (MID) that defines which unit/module the power management action has to be applied to.

As mentioned hereinabove, the stimulation biphasic current pulses used to generate a phosphene can be described by three parameters, which are the amplitude, the phase duration and the inter-phase duration of the pulses. Each one of theses parameters, as well as the pulse frequency, influences the phosphenes visual appearance. It would require a high data transmission rate to send in real time all the stimulation parameters as well as the addresses of the corresponding stimulation sites from the external unit 6 to the implant 4. In order to reduce this rate, the needed stimulation data can be transferred as follows. First, each

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of the parameters is, beforehand, defined to be common or specific. A common parameter is shared by all the stimulation sites and has to be loaded only once at the beginning. However, the specific parameters have to be updated at each activation site. As an example, the phase and inter-phase durations can be common, and the amplitude can be specific. Using one or two common parameters allows a significant reduction in the transmission rate between the external unit 6 and the implant 4. The choice of which parameters are common or specific, as well as the number of bits necessary to specify each one of them can be set at any time in the configuration mode.

Secondly, instead of sending the stimulation site address with each parameter, the RAM 64 (Figure 8) is used. During the configuration phase of the implant 4, the external unit 6 fills the memory 64 with the scan sequence of each frame in an image that will be used by both devices (the implant 4 and the external unit 6). The stimulation parameters are then sent in the order specified in the memory 64.

This kind of transfer of the needed data makes the implant 4 highly configurable, allowing the external unit 6 to fully control the stimulation operations and allowing a higher frame (image) transmission rate, if needed.

Referring to Figure 8, in operation, the stimulation commands generator 66 combines the common parameter data with each specific stimulation word to generate the proper stimulation control signals for the stimuli generator unit 44, indicating in particular the amplitude of the biphasic pulse (StimAmp), the phase duration of the pulse (PhaseDur), the interphase duration of the pulse (InterDur), the stimulation site address (StimSite), the stimulation channel number (StimChan).

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Referring to Figure 9, when a particular channel controller 86 receives the stimulation control signals, it loads the data into the set of temporary registers 92. Once the previous stimulation is completed, the data are transferred into the main registers 94 as a result of a control performed by the channel controller (Idnp and Idcp signals). The DAC 90 is responsive to the channel controller 86 (Stim signal) and generates a stimulation current having an amplitude depending on the StimAmp value. The stimulation operation begins using the site address bus 164 to select the proper site in the channel and the Stim signal to start and stop stimulation. The channel controller 86 uses the timer 88 based on the stimulation clock 70 (Figure 8) to set the phase and interphase durations of the pulses.

Referring to Figure 7, the external unit 6 has an image processor and command generator module 174 connected to the camera 8 for processing image data signals corresponding to a real life scene captured by the camera 8, in accordance with predetermined processing operations, and for generating implant compatible stimulation commands causing the implant 4 to produce the artificial image on the visual cortex corresponding to the real scene image. A transceiver module 176 preferably in the form of a FM bi-directional data transfer and energy transmitter is connected to the image processor and command generator module, for producing airwave-transmitted implant control signals carrying the stimulation commands, as depicted by the arrows 42. The external unit 6 is preferably powered by a battery 204.

Referring to Figures 7 and 17, the processing operations performed by the image processor and commands generator 174 on the real life scene 170 subjected to acquisition 178 by the camera 8 can be a digitalization of the image data signals to form a digital image 180, an image reduction of the digital image 180 into a scaled down image 182 having a

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same resolution as the electrode array 14, and an image enhancement of the scaled down image 14 to form an enhanced image 184 corresponding to the artificial image produced by the implant unit 4 and from which the stimulation commands 186 are generated.

The external unit 6 may be provided with a pattern generation interface (not shown) where the command words are formed from internal patterns instead of the image sensor 8. Such a feature would allow to quickly test recognizable patterns like a square, a circle or a cross for adjustment of the implant 4 to the user 2.

Once the image 182 has the proper resolution, basic image enhancement techniques are preferably applied. The purpose of the enhancement is to give to the image more balanced contrasts and luminosity. The applied technique can be a linear histogram equalization consisting of stretching the image histogram to cover the totality of the available pixel intensity spectrum. It is not necessary to calculate the whole histogram since only the minimum and maximum pixel intensities are useful. With those values, a look-up table can be built to transform, one by one, each pixel of the initial image.

Figures 18A-B and 19A-B illustrate scaled-down and enhanced images generated by the image processor 174 (Figure 7), and the corresponding histograms respectively. As it can be seen, the histogram shown in Fig. 19B, corresponding to the enhance image shown in Figure 19A, covers a wider spectrum than the histogram shown in Figure 18B for the image prior to enhancement as shown in Figure 18A.

After the image enhancement, each pixel of the resulting image will represent a phosphene that should be created during the cortex stimulation. To create this phosphene, a command word must be created to specify every stimulation

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parameter, from waveform shape to phase delay. Since many of the parameters affect only the qualitative part of phosphene appearance and the effects of their modification is not currently thoroughly known, those parameters must be easily and quickly alterable. In addition, when stimulating biological cells with an electrical current, the stimulation of the same cells, or cells in the surrounding, cannot be repeated before a delay of few ms. This delay is called repolarization time. For this reason, serial scanning cannot be used for the stimulation of the cortex in order to create an image. Instead, a scan sequence must be selected in such a way that each sequential stimulation is not executed in an area where a stimulation occurred before the repolarization time is elapsed. The flexibility of the implant system according to the invention allows the use of any desired scanning sequence and the configuration of the implant 4 with the same sequence.

Referring to Figures 7 and 20, the external unit 6 may be provided with a communication port 188 for communication with a computer (not shown) for configuration and test purposes. For example, to test the system, easily recognizable shapes may be used to test the phosphene apparition parameters, as mentioned hereinabove. Those shapes can be generated by the external unit 6 in response to a test request issued by the computer, as inputted through a user interface 190. The user can select different patterns 192 and adjust the parameters 194 on the fly. For example, a square, a cross or a circle may be selected, each of which can be in a solid or outline form. Character generation can also be implemented to enable more complex shapes. For greater user control, those patterns may bypass the usual data pathway and directly generate the command words in the external unit 6.

The user interface 190 may display a source image 196 as captured by the camera 8 or from another source, and the

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corresponding image 198 reduced to the resolution of the electrode array 14, in its enhanced form. The reduced image resolution can be changed instantly within the drop down menu list 200.

Referring to Figure 7, the camera 8 has preferably a variable resolution providing an electronic zoom function. Such a feature can be used to adapt the low resolution of the image transmitted to the implant 4 (e.g. 25 x 25) to the situation in which the user is. For example, the user may choose between a coarse view over a large field of vision or, conversely, a detailed view over a limited zone in order to discern the details of a point of interest or for reading purposes.

Instead of using a predetermined addressing process using the RAM 64 (see Figure 8) as hereinabove described, which allows to reduce the pass-band of the transmitted data when the stimulation sequence and the pixel numbers are constant for each image, a specific addressing process can also be implemented to allow the stimulation sites to be chosen according to each image to be transmitted. Then, by setting a light intensity threshold under which the stimulation effect is considered to be negligible, certain pixels of the image will be simply disregarded by the external unit 6. As a result, power consumption can be thereby reduced while the image refresh rate is improved. Preferably, the threshold is adjustable in order to discriminate the pixels to be transmitted from those to be discarded. Other suitable addressing methods can also be implemented.

The implant system according to the invention can be equipped for example with an ultrasound sensor (not shown) having a large field of detection, preferably set as a function of the minimum zoom of the camera 8 or larger, providing information on the proximity of detected objects,

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which information affects the light intensity transmitted to the brain. Such a system would allow the user to move smoothly by following the dark or clear zones that he or she sees, without requiring visual recognition of the surrounding objects, which may be difficult to achieve at a low resolution (e.g. 25 x 25).

While embodiments of this invention have been illustrated in the accompanying drawings and described above, it will be evident to those skilled in the art that changes and modifications may be made therein without departing from the essence of this invention. All such modifications or variations are believed to be within the scope of the invention as defined by the claims appended hereto.

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CLAIMS:

1. A body implant assembly comprising:

an electrode array having multiple adjacent electrodes directed towards respective stimulation sites;

an antenna;

a full custom mixed-signal chip including a transceiver circuit coupled to the antenna, an AC to DC transformation circuit coupled to the transceiver circuit and powering the full custom mixed-signal chip from energy contained in a control signal received by the transceiver circuit, a controller connected to the transceiver circuit and processing operation data contained in the control signal received by the transceiver circuit, and a stimuli generator circuit connected to the controller and generating stimulation signals in accordance with the operation data;

an electrode selection circuit connected to the stimuli generator circuit and having selectable outputs for transmission of the stimulation signals to selected ones of the electrodes in accordance with the operation data; and

a substrate support having a first side receiving the full custom mixed-signal chip, the antenna and the electrode selection circuit, and a second, opposite side receiving the electrode array, the first side having contacts lying around the full custom mixed-signal chip and connected to the outputs of the electrode selection circuit respectively, the second side having an array of adjacent contacts aligned with and connected to the electrodes respectively, the contacts on the first and second sides being interconnected respectively together by an interconnection circuit across the substrate support.

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2. The body implant assembly according to claim 1, wherein the interconnection circuit comprises circuit layers made in the substrate support and stacked between the sides thereof, the circuit layers interconnecting the contacts on the first side with the contacts on the second side respectively.

3. The body implant assembly according to claim 1, wherein the contacts on the first side are distributed in an alternate shifted pattern over two adjacent sets of rows surrounding the full custom mixed-signal chip; and

4. The body implant assembly according to claim 1, wherein:

the substrate support has a substantially flat front portion embedding the full custom mixed-signal chip and the electrode selection circuit, and a smaller rear portion projecting behind the front portion and receiving the electrode array, the first and second sides of the substrate support being on foremost and rearmost faces of the front and rear portions respectively;

the contacts on the first side project through and appear behind the front portion around the rear portion; and

the interconnection circuit comprises a series of peripheral contacts surrounding the array of adjacent contacts on the rearmost face of the rear portion, a wire bond interconnecting the peripheral contacts with the contacts appearing behind the front portion respectively, and circuit layers made in the rear portion and stacked between the rearmost face and a foremost face thereof, the circuit layers interconnecting the peripheral contacts with the array of adjacent contacts respectively.

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5. The body implant assembly according to claim 1, wherein the full custom mixed-signal chip includes the electrode selection circuit.

6. The body implant assembly according to claim 1, wherein the antenna extend on the substrate support around the full custom mixed-signal chip.

7. The body implant assembly according to claim 1, wherein the full custom mixed-signal chip includes a monitoring circuit coupled between the electrode selection circuit and the controller, the monitoring circuit taking measurements of the stimulation signals in response to monitoring control signals issued by the controller depending on the operation data, and transmitting the measurements to the controller, the controller processing the measurements and transmitting test result signals to the transceiver circuit for emission out of the body implant depending on the operation data.

8. The body implant assembly according to claim 1, wherein the electrode array is made of biocompatible material, and has a 1 cm^2 cross-section, the electrodes comprising hundreds of needles distributed in rows and columns across the 1 cm^2 cross-section, and the substrate support has a thickness substantially less than 1 mm.

9. The body implant assembly according to claim 8, wherein the needles have an average height of 1,5 mm and are spaced from one another by 400 µm.

10. A body implant comprising:

an electrode array having multiple adjacent electrodes directed towards respective stimulation sites;

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an antenna;

a transceiver circuit coupled to the antenna;

an AC to DC voltage transformation circuit coupled to the transceiver circuit and providing implant power supply from energy contained in an implant control signal received by the transceiver circuit;

a controller connected to the transceiver circuit and processing operation data contained in the implant control signal received by the transceiver circuit;

a stimuli generator circuit connected to the controller and generating stimulation signals in accordance with the operation data; and

an electrode selection circuit connected between the stimuli generation circuit and the electrode array, the electrode selection circuit having selectable outputs for transmission of the stimulation signals to selected ones of the electrodes in accordance with the operation data;

the controller having a decoder circuit decoding the operation data contained in the implant control signal, a configuration controller storing common and specific stimulation parameters specified in the operation data and respectively addressed to all of the stimulation sites and specific ones of the stimulation sites, and a stimulation command controller transmitting stimulation control signals to the stimuli generator circuit in accordance with the common and specific stimulation parameters.

11. The body implant according to claim 10, wherein the controller further has a memory coupled between the configuration controller and the stimulation command controller, and storing a stimulation sequence specified in the operation data and representing an order of selection of the outputs of the electrode selection circuit for the stimulation signals respectively.

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12. The body implant according to claim 10, wherein the common parameters comprise an amplitude of the stimulation signals, a duration of pulses in the stimulations signals, and a delay between two bipolar phases of the stimulation signals, the configuration controller storing an indication.

13. The body implant according to claim 10, wherein the decoder circuit comprises a frame detector detecting data frames contained in the implant control signal, and an error correction and command word decoder producing command words forming the operation data for the controller, the configuration controller and the stimulation command controller being connected to the error correction and command word decoder.

14. The body implant according to claim 10, wherein the transceiver circuit has an output producing a clock signal recovered from the implant control signal and transmitted to the controller as a timing base.

15. The body implant according to claim 10, wherein the controller has a power management module connected to the decoder circuit and to predetermined circuits of the body implant, for controllably turning said predetermined circuits on and off in accordance with the operation data.

16. A body implant comprising:

an electrode array having multiple adjacent electrodes directed towards respective stimulation sites;

an antenna;

a transceiver circuit coupled to the antenna;

an AC to DC voltage transformation circuit coupled to the transceiver circuit and providing implant power supply

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from energy contained in an implant control signal received by the transceiver circuit;

a controller connected to the transceiver circuit and processing operation data contained in the implant control signal received by the transceiver circuit;

a stimuli generator circuit connected to the controller and generating stimulation signals in accordance with the operation data;

an electrode selection circuit connected between the stimuli generation circuit and the electrode array, the electrode selection circuit having selectable outputs for transmission of the stimulation signals to selected ones of the electrodes in accordance with the operation data; and

a monitoring unit coupled between the controller and the electrode selection circuit, and controllably taking signal measurements at selected ones of the stimulation sites in response to monitoring control signals and producing test result signals indicative of the signal measurements;

the controller having a decoder circuit decoding the operation data contained in the implant control signal, a monitoring command generator decoding diagnosis instructions contained in the operation data and transmitting the monitoring control signals to the monitoring unit in accordance with the diagnosis instructions, and a diagnosis controller receiving and processing the test result signals from the monitoring unit.

17. The body implant according to claim 16, wherein the monitoring unit has an internal signal source module generating test signals used as the stimulation signals depending on the monitoring control signals, a current and voltage measuring circuit measuring a stimulation current and a monitored voltage across a monitored one of the stimulation sites in response to a corresponding one of the stimulation

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signals, a peak detector measuring a peak magnitude of the voltage, and a phase detector measuring a phase between the stimulation current and the monitored voltage, the test result signals being derived from the stimulation current, the monitored voltage and the phase.

18. The body implant according to claim 16, wherein the diagnosis controller is connected to the transceiver circuit, the test result signals being transmitted from the diagnosis controller to the transceiver circuit for emission out of the body implant depending on the operation data.

19. The body implant according to claim 18, wherein the diagnosis controller has connections with predetermined circuits of the implant to transmit test vectors contained in the operation data thereto and to receive resulting test result signals thereof.

20. A body implant comprising:

an electrode array having multiple adjacent electrodes directed towards respective measurement sites;

an antenna;

a transceiver circuit coupled to the antenna;

an AC to DC voltage transformation circuit coupled to the transceiver circuit and providing implant power supply from energy contained in an implant control signal received by the transceiver circuit;

a controller connected to the transceiver circuit and processing operation data contained in the implant control signal received by the transceiver circuit;

an electrode selection circuit connected to the electrode array, the electrode selection circuit having selectable outputs for communication with selected ones of the electrodes and the respective measurement sites; and

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a monitoring unit coupled between the controller and the electrode selection circuit, and controllably taking signal measurements at the selected ones of the measurement sites in response to monitoring control signals and producing test result signals indicative of the signal measurements;

the controller having a decoder circuit decoding the operation data contained in the implant control signal, a monitoring command generator decoding diagnosis instructions contained in the operation data and transmitting the monitoring control signals to the monitoring unit in accordance with the diagnosis instructions, and a diagnosis controller receiving and processing the test result signals from the monitoring unit.

21. The body implant according to claim 20, wherein the monitoring unit has a current and voltage measuring circuit measuring a current and a voltage across a monitored one of the measurement sites, a peak detector measuring a peak magnitude of the voltage, and a phase detector measuring a phase between the current and the voltage, the test result signals being derived from the current, the voltage and the phase.

22. The body implant according to claim 20, wherein the diagnosis controller is connected to the transceiver circuit, the test result signals being transmitted from the diagnosis controller to the transceiver circuit for emission out of the body implant depending on the operation data.

23. A body implant comprising:

an electrode array having multiple adjacent electrodes directed towards respective stimulation sites;

an antenna;

a transceiver circuit coupled to the antenna;

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an AC to DC voltage transformation circuit coupled to the transceiver circuit and providing implant power supply from energy contained in an implant control signal received by the transceiver circuit;

a controller connected to the transceiver circuit and processing operation data contained in the implant control signal received by the transceiver circuit;

a stimuli generator circuit connected to the controller and generating stimulation signals in accordance with the operation data; and

an electrode selection circuit connected between the stimuli generation circuit and the electrode array, the electrode selection circuit having selectable outputs grouped into channels for transmission of the stimulation signals to selected ones of the electrodes in accordance with the operation data;

the electrode selection circuit including, for each channel, a demultiplexer circuit connected to and operating switch arrangements in accordance with site and polarity control signals, the switch arrangements being subjected to the stimulation signals and connected respectively to the outputs assigned to the channel;

the stimuli generator circuit including, for each channel, a signal generator controlled by a channel controller assisted by a timer connected to a register circuit receiving stimulation control signals, the signal generator producing the stimulation signals in accordance with the stimulation control signals, the register circuit and the channel controller producing the site and polarity control signals in accordance with the stimulation control signals; and

the controller having a decoder circuit decoding the operation data contained in the implant control signal, a configuration controller storing stimulation parameters

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specified in the operation data, and a stimulation command controller transmitting the stimulation control signals to the stimuli generator circuit in accordance with the stimulation parameters.

24. The body implant according to claim 23, wherein each register circuit comprises first and second sets of registers, one of which being used to load the stimulation control signals for a next stimulation while the other one being used to provide the stimulation control signals for a current stimulation.

25. The body implant according to claim 23, wherein each signal generator comprises a digital to analog converter producing an analog current signal forming one of the stimulation signals.

26. The body implant according to claim 23, further comprising:

a monitoring unit coupled between the controller and the electrode selection circuit, and controllably taking measurements of selected ones of the stimulation signals in response to monitoring control signals and producing test results signals indicative of the measurements;

and wherein:

the electrode selection circuit further includes, for each channel, a multiplexer circuit connected to the outputs assigned to the channel for selective monitoring thereof by the monitoring unit depending on a monitoring channel signal; and

the controller includes a monitoring command generator decoding diagnosis instructions contained in the operation data and transmitting the monitoring control signals to the monitoring unit and the monitoring channel signal to the

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electrode selection circuit in accordance with the diagnosis instructions, and a diagnosis controller receiving and processing the test result signals from the monitoring unit.

27. The body implant according to claim 26, wherein the monitoring unit comprises a peak detector measuring a highest amplitude level of a monitored one of the stimulation signals, and a comparator producing an overflow signal when the highest amplitude level exceeds a predetermined safety threshold, the overflow signal being reported to the diagnosis controller for processing thereof.

28. An artificial vision system for stimulating a visual cortex of a blind person, comprising:

a body implant including an electrode array having multiple adjacent electrodes applicable against the visual cortex of the blind person, and a micro-stimulator means mounted on a back side of the electrode array, for selectively generating stimulation signals on the electrodes producing phosphenes on the visual cortex representing an artificial image in response to airwave-received implant control signals; and

an external unit including an image sensor adapted to take a real scene image, an image processor and command generator means connected to the image sensor for processing image data signals produced by the image sensor in accordance with predetermined processing operations and generating implant compatible stimulation commands causing the body implant to produce the artificial image on the visual cortex corresponding to the real scene image, and a transceiver circuit connected to the image processor and command generator means, for producing airwave-transmitted implant control signals carrying the stimulation commands, the processing operations including a digitalization of the image

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data signals to form a digital image, an image reduction of the digital image into a scaled down image having a same resolution as the electrode array, and an image enhancement of the scaled down image to form an enhanced image corresponding to the artificial image produced by the implant unit and from which the stimulation commands are generated.

29. The artificial vision system according to claim 28, wherein the image reduction comprises a determination of an average light intensity on complementary areas of the digital image covering a predetermined number of adjacent pixels, each one of the areas corresponding to one of the electrodes of the electrode array, the stimulation commands being produced as a function of the average light intensity.

30. The artificial vision system according to claim 29, wherein the image enhancement comprises a linear histogram equalization of the scaled down image based on maximum and minimum pixel intensities detected in the scaled down image.

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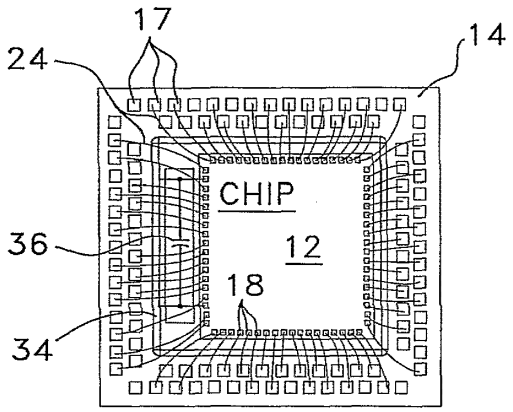


FIG. 1

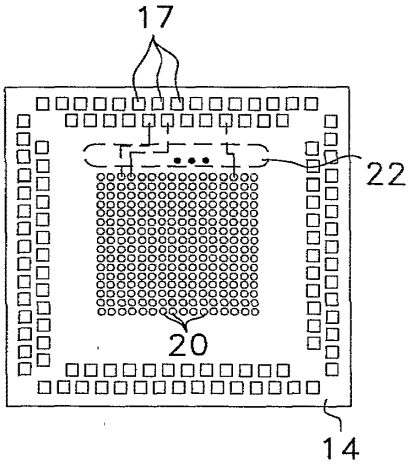


FIG. 2

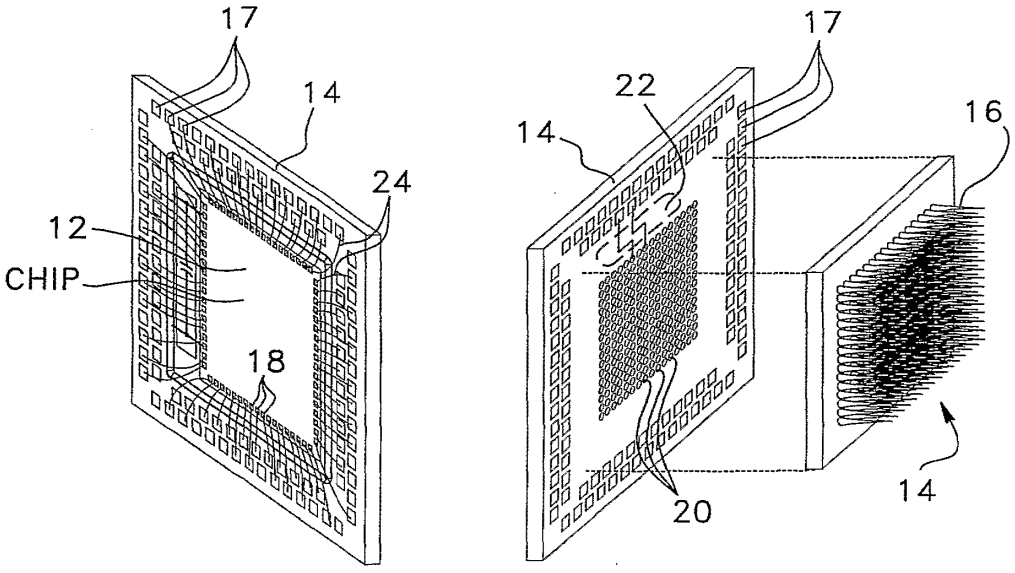


FIG. 3

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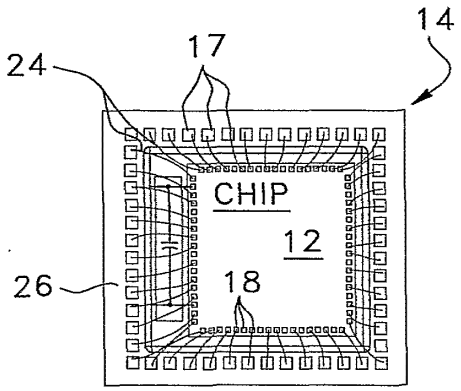


FIG. 4

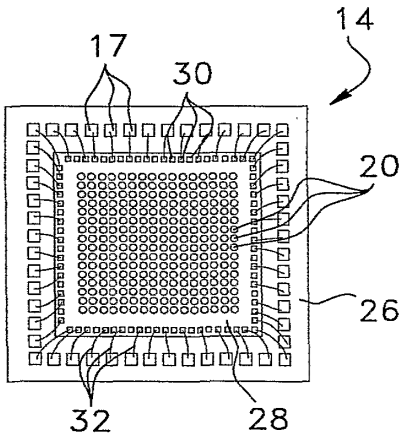


FIG. 5

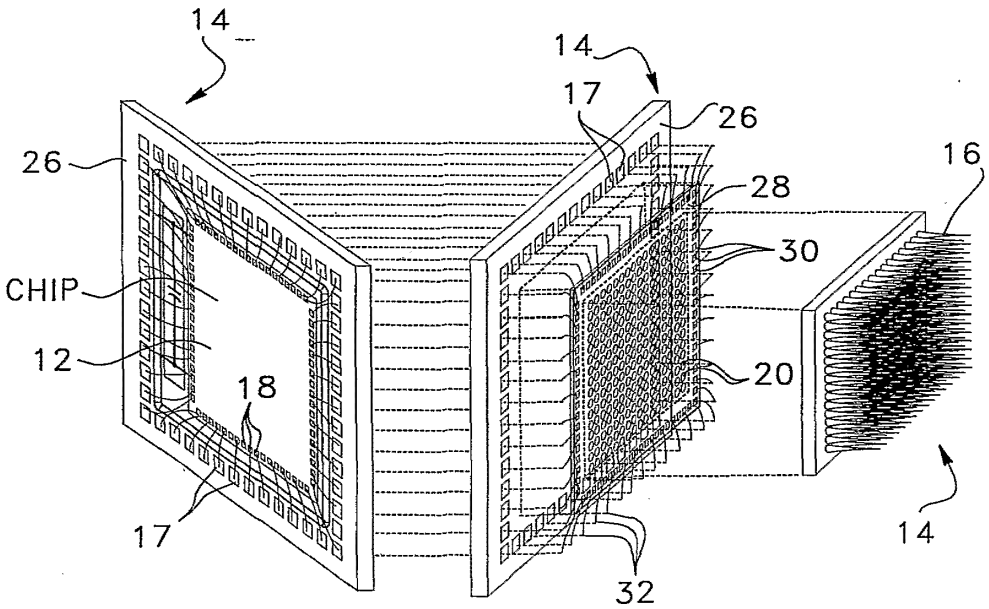


FIG. 6

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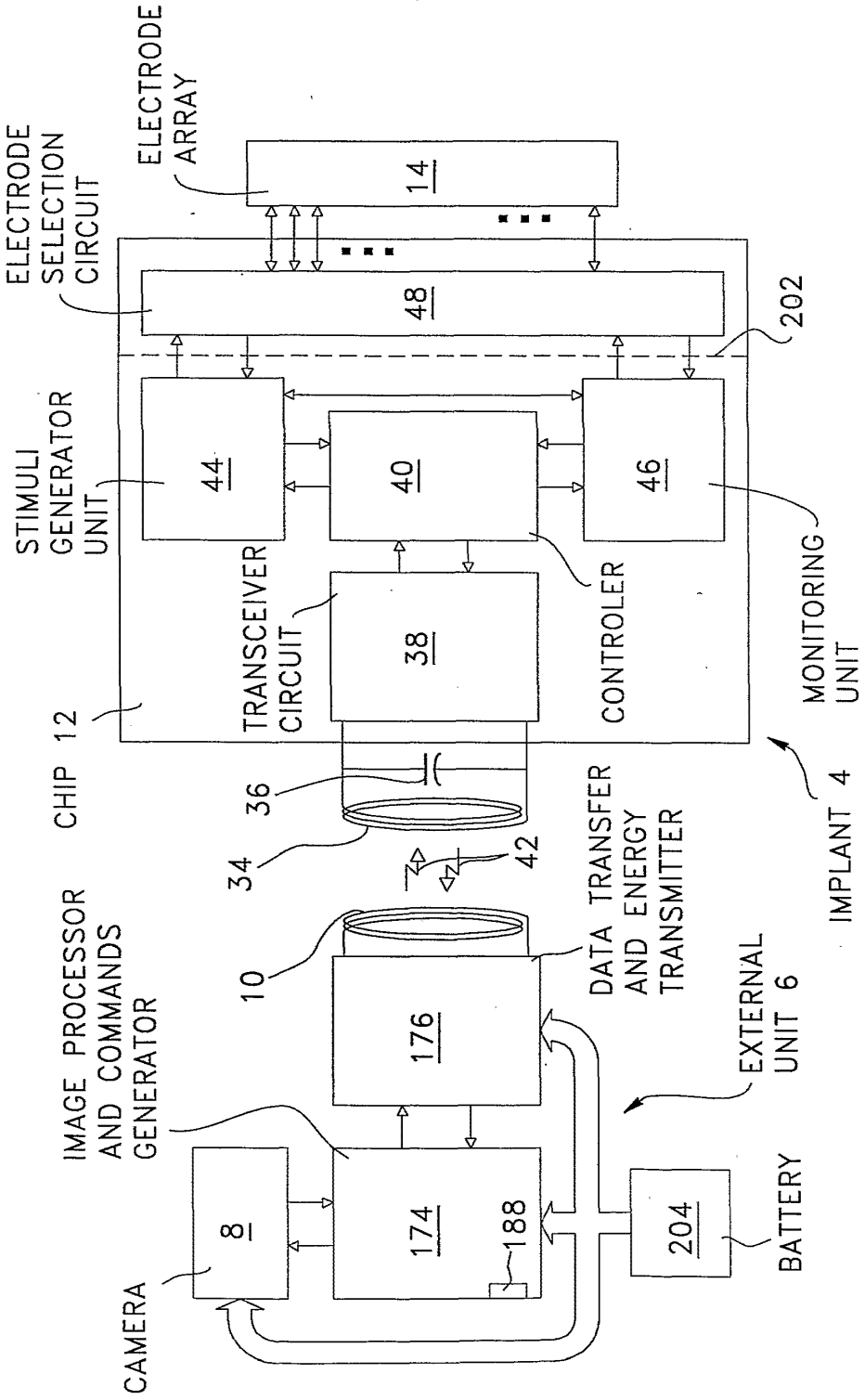


FIG. 7

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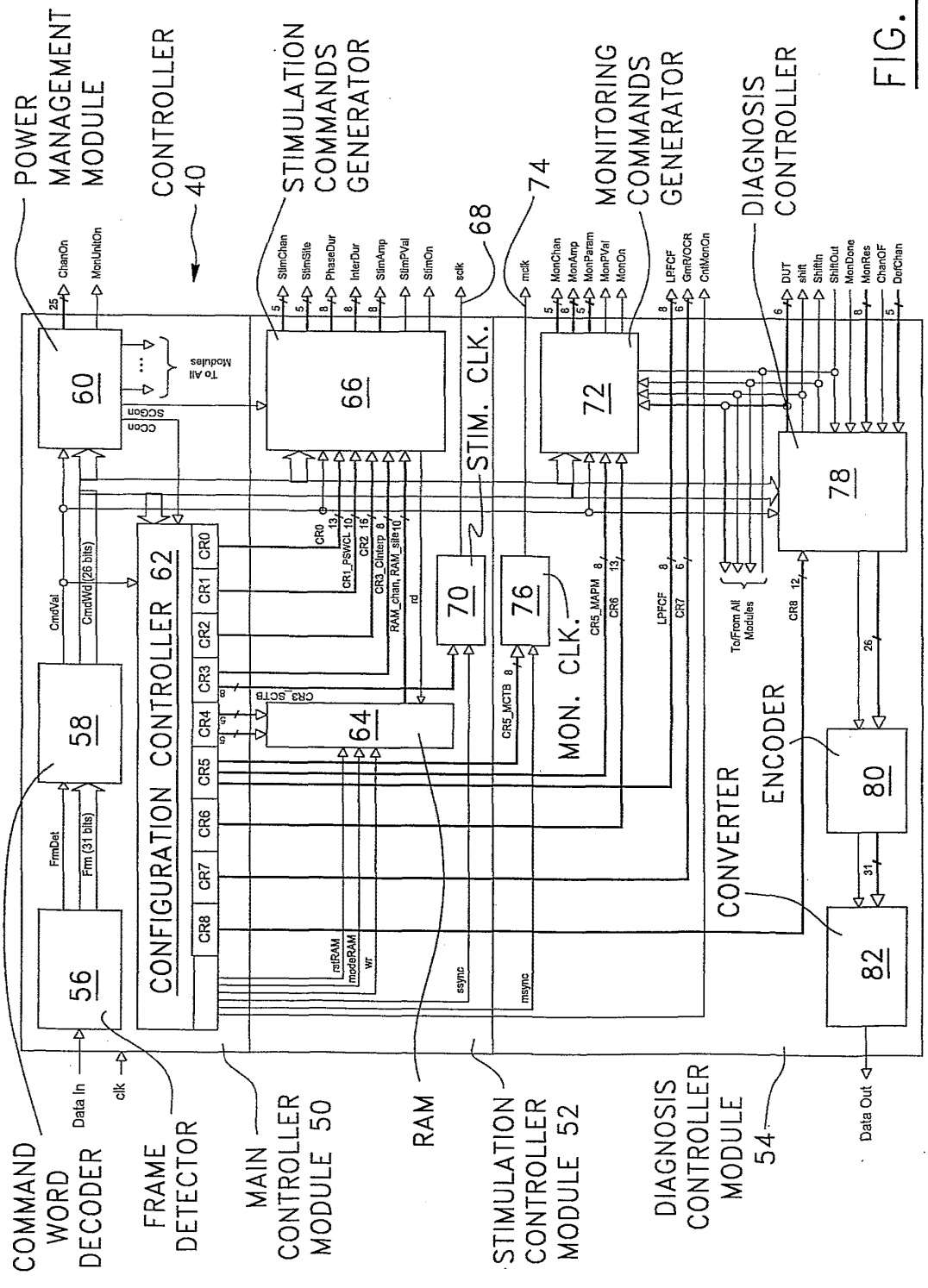


FIG. 8

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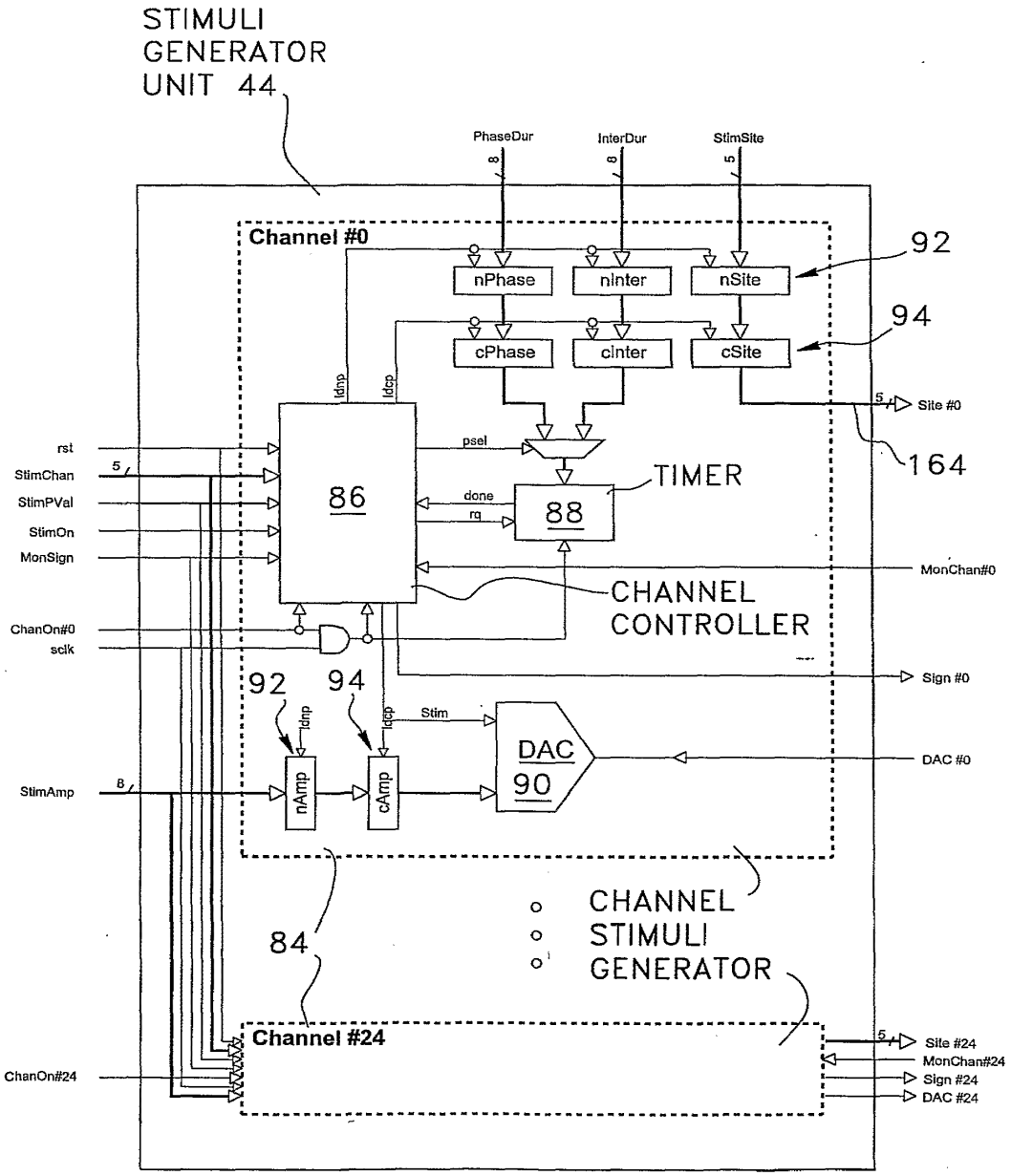


FIG. 9

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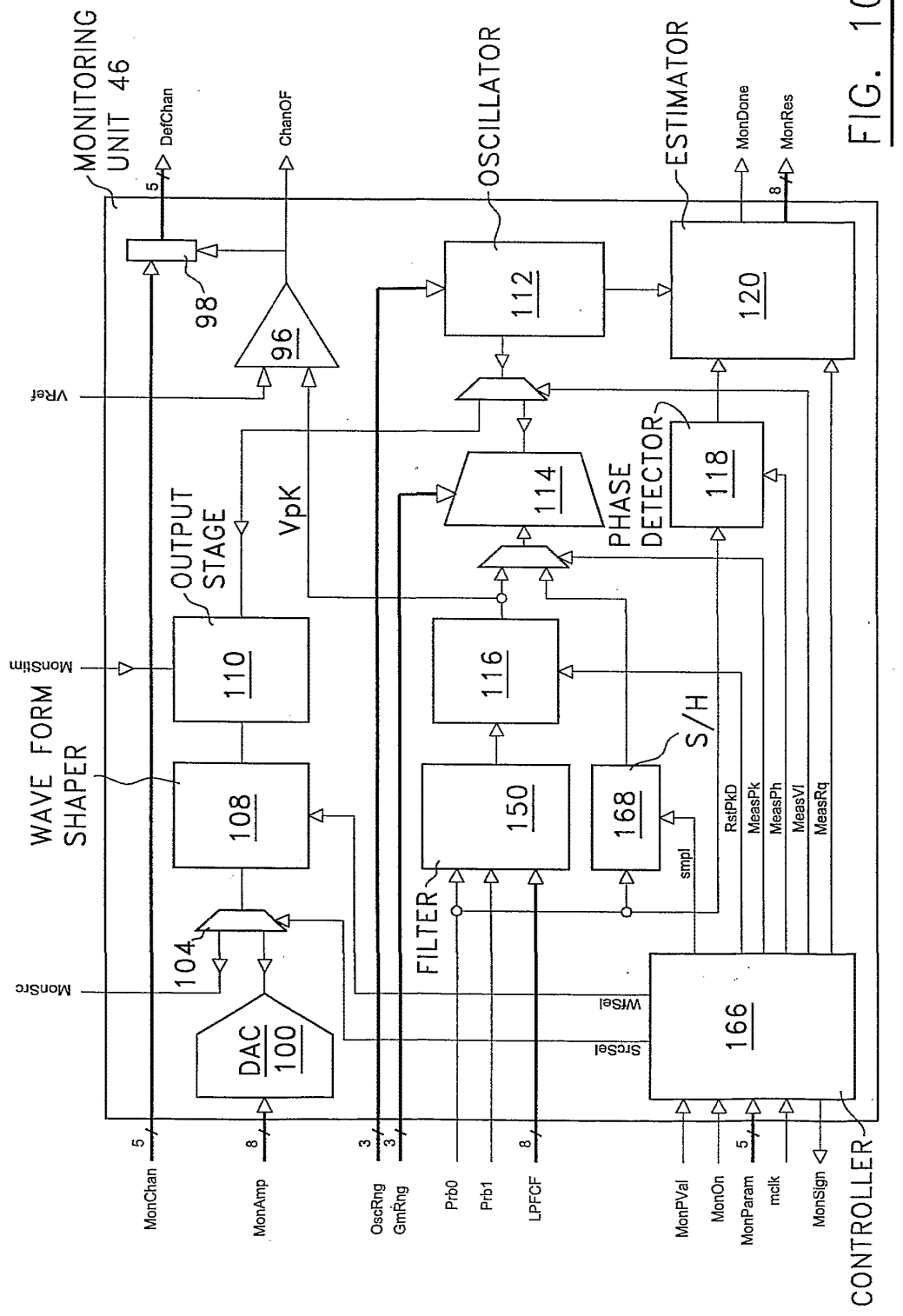


FIG. 10

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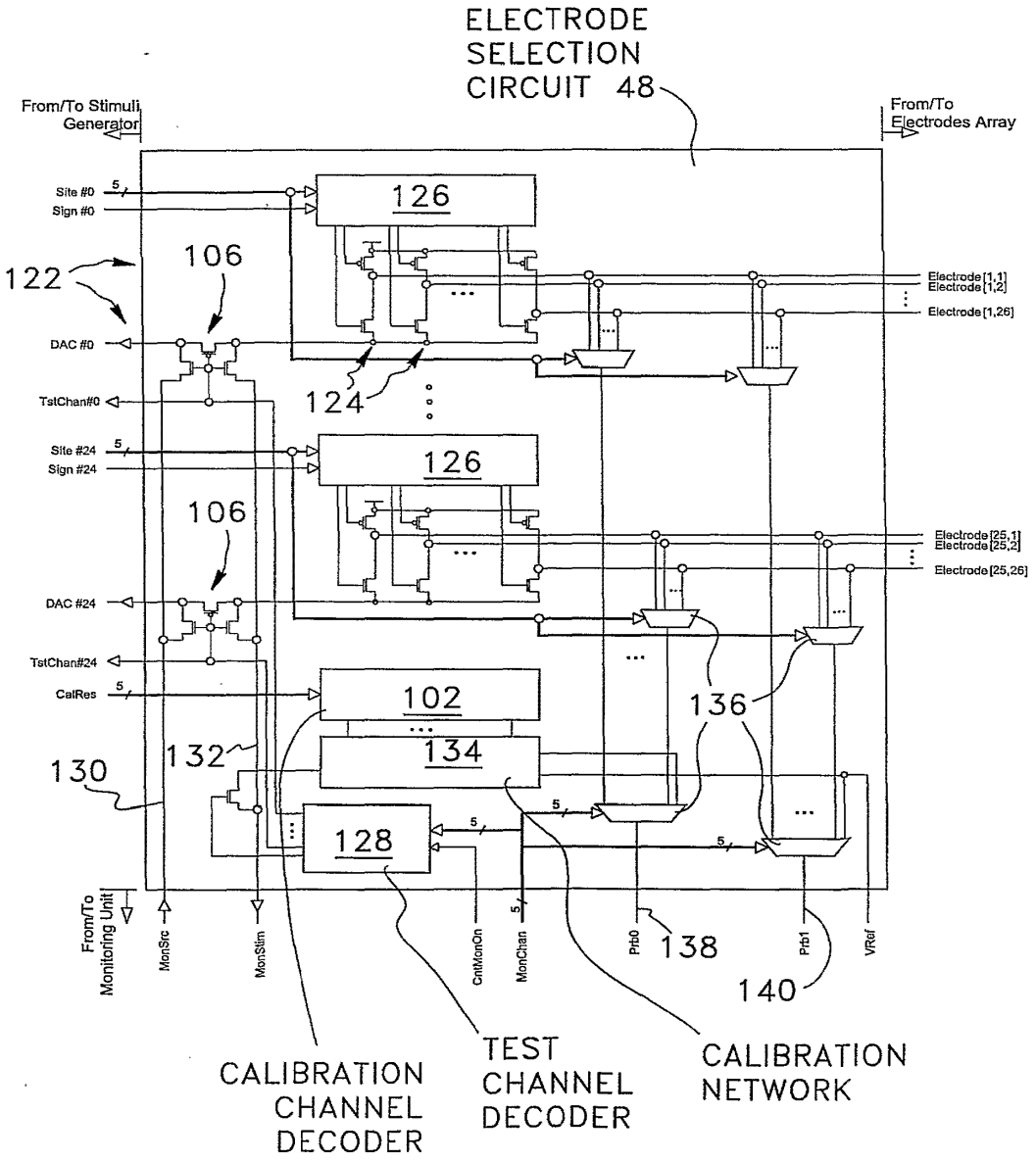
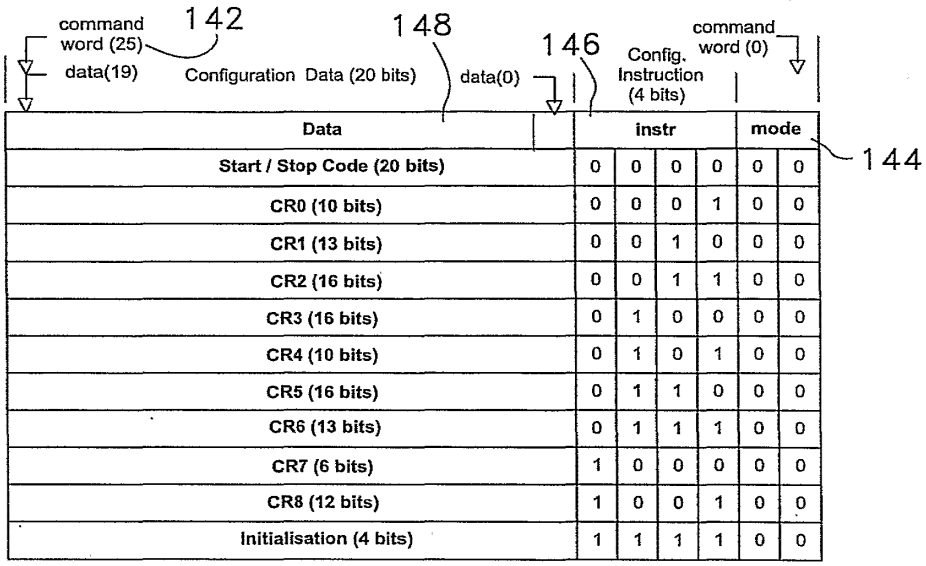


FIG. 11

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Data	instr				mode	
Start / Stop Code (20 bits)	0	0	0	0	0	0
CR0 (10 bits)	0	0	0	1	0	0
CR1 (13 bits)	0	0	1	0	0	0
CR2 (16 bits)	0	0	1	1	0	0
CR3 (16 bits)	0	1	0	0	0	0
CR4 (10 bits)	0	1	0	1	0	0
CR5 (16 bits)	0	1	1	0	0	0
CR6 (13 bits)	0	1	1	1	0	0
CR7 (6 bits)	1	0	0	0	0	0
CR8 (12 bits)	1	0	0	1	0	0
Initialisation (4 bits)	1	1	1	1	0	0

FIG. 12

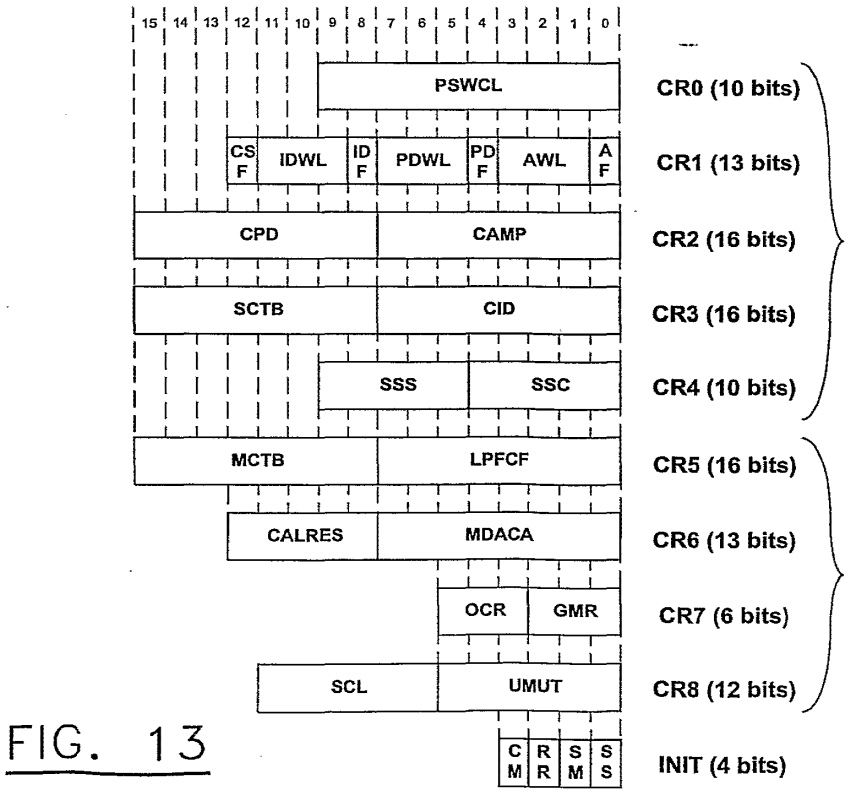


FIG. 13

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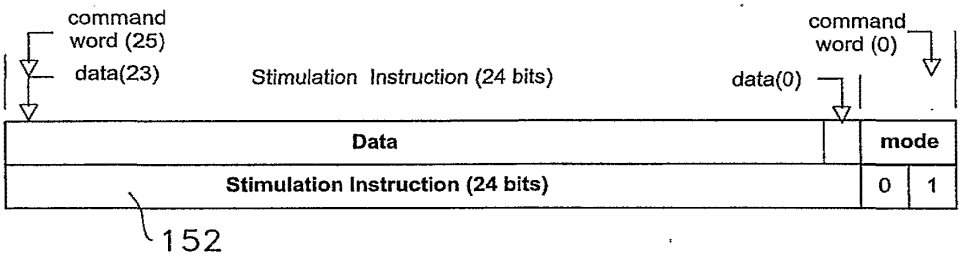


FIG. 14

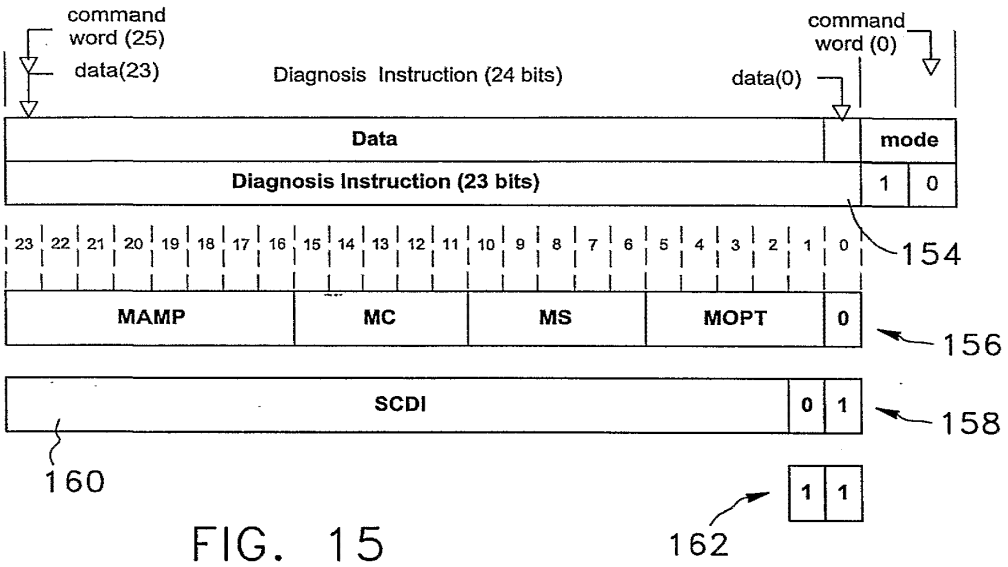


FIG. 15

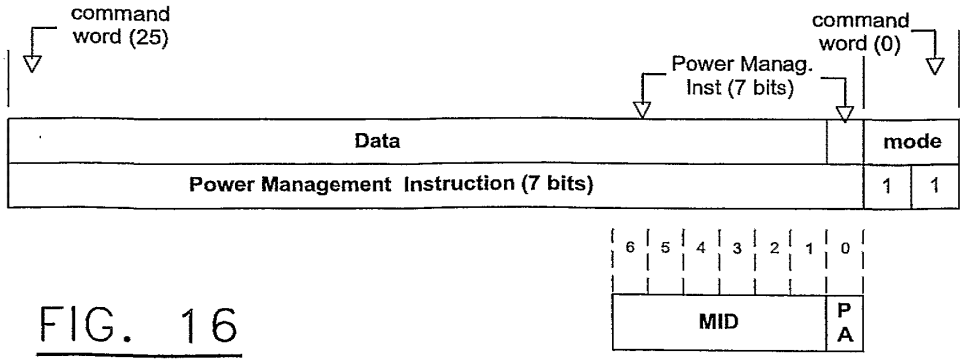


FIG. 16

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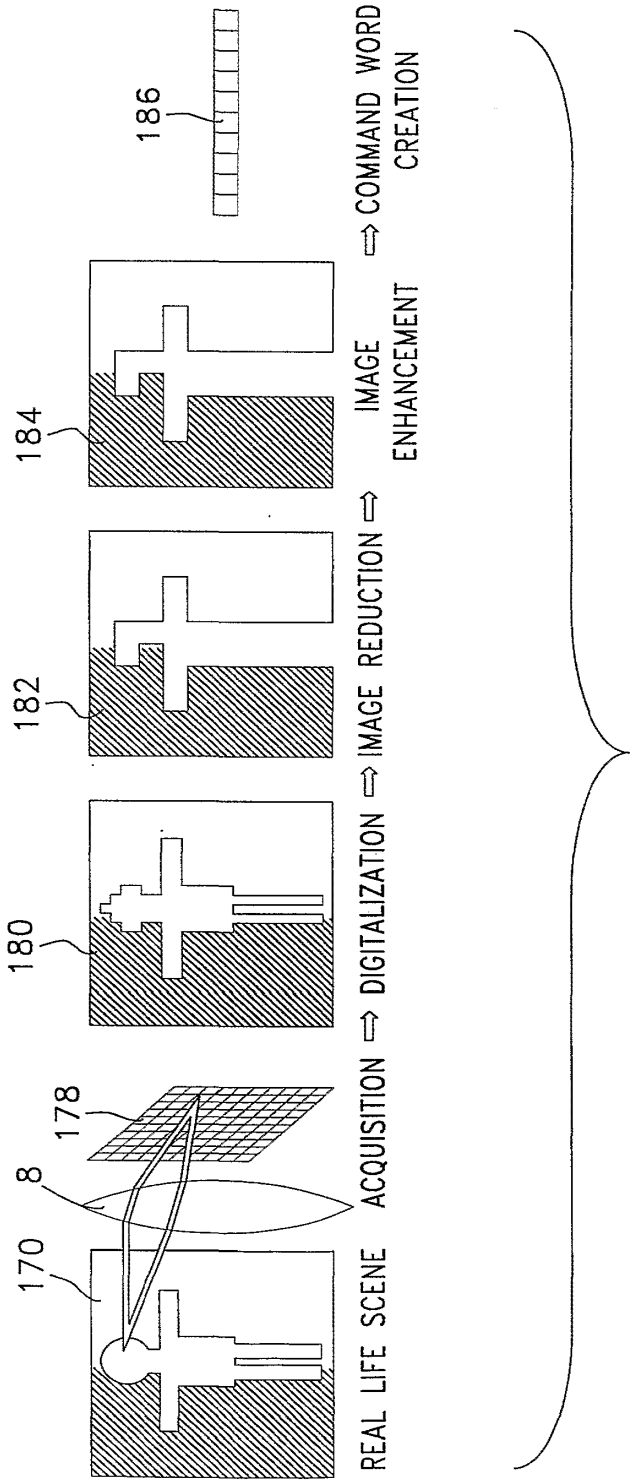


FIG. 17

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FIG. 18B

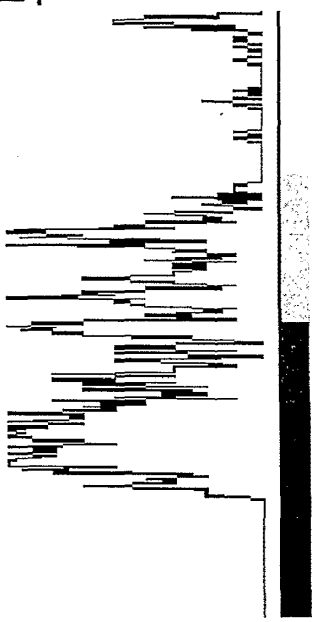
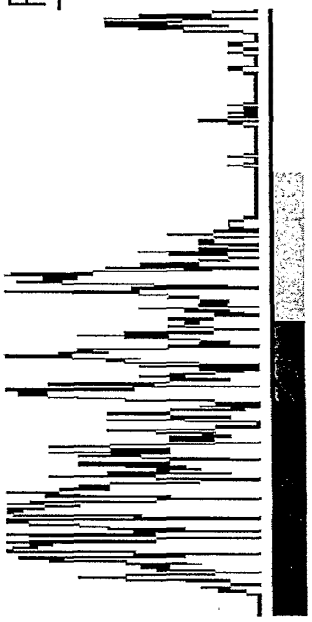




FIG. 18A

FIG. 19B



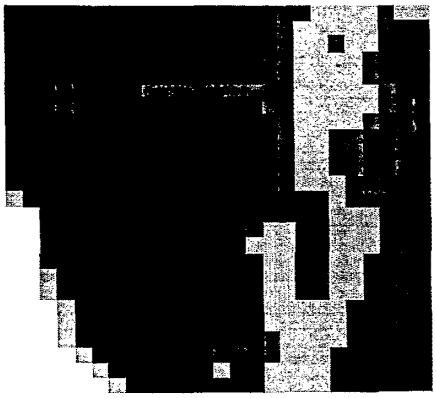


FIG. 19A

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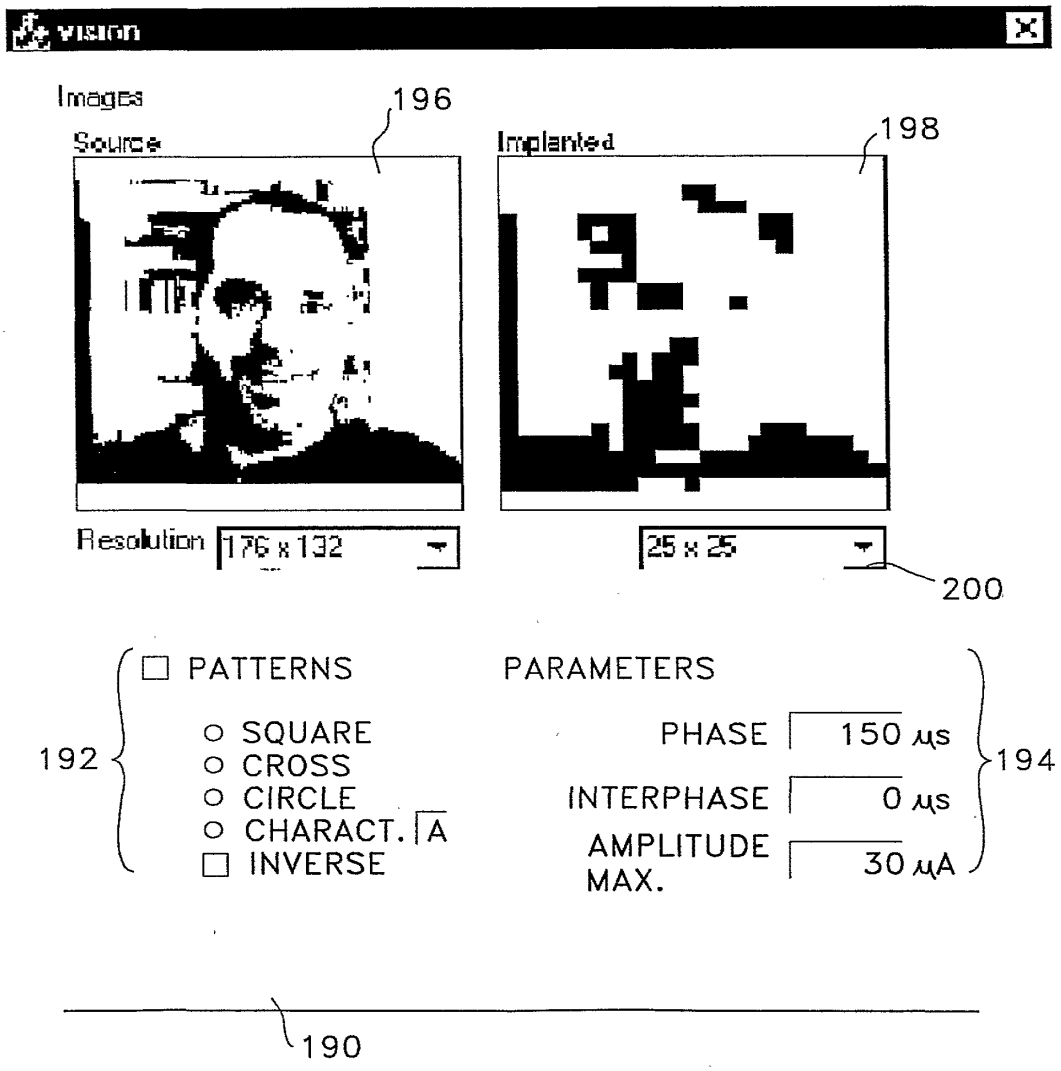


FIG. 20

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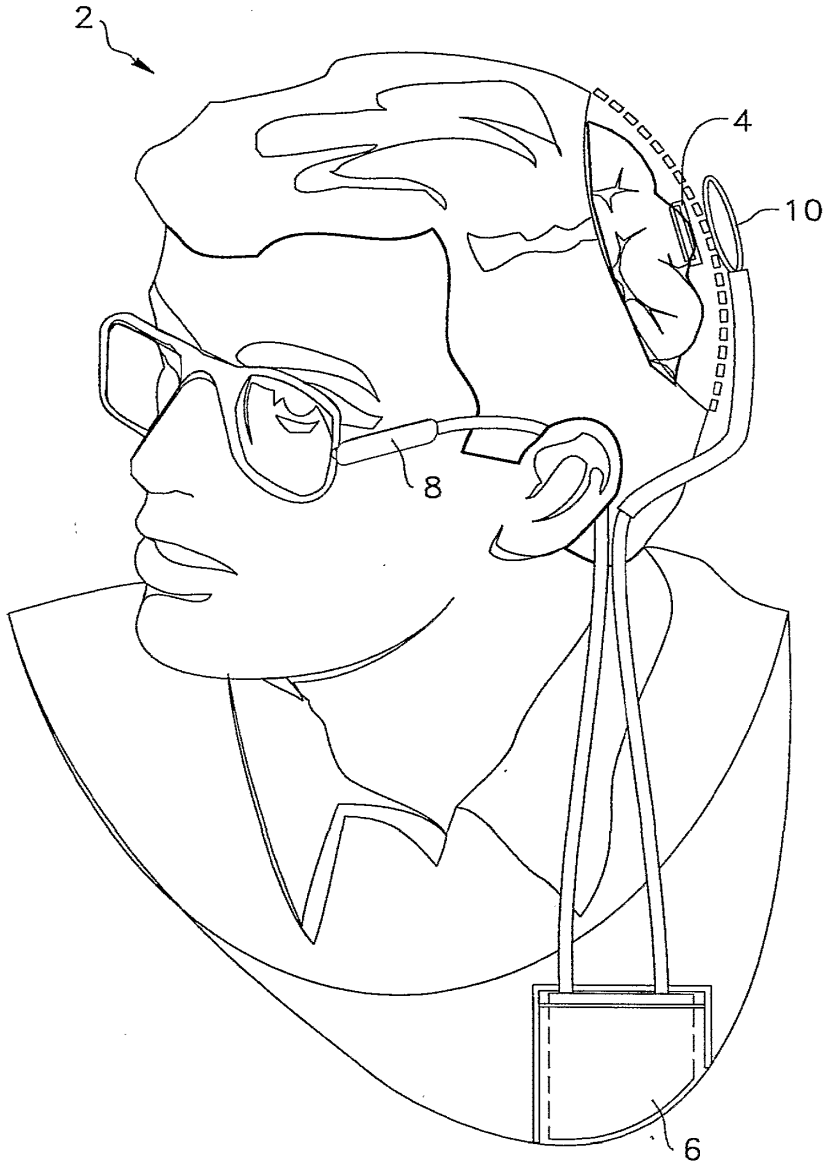


FIG. 21

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 00/01374

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61N1/36 A61N1/05

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 969 468 A (SCHULMAN JOSEPH H ET AL) 13 November 1990 (1990-11-13) column 7, line 67 -column 8, line 31; figures 12,13 ---	1,10,16, 20,23,28
A	US 5 935 155 A (DE JUAN JR EUGENE ET AL) 10 August 1999 (1999-08-10) column 4, line 36 -column 5, line 50 --- -/--	1,10,16, 20,23,28

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 June 2001	06/07/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Grossmann, C.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 00/01374

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	CAMPBELL P K ET AL: "A SILICON-BASED, THREE-DIMENSIONAL NEURAL INTERFACE: MANUFACTURING PROCESSES FOR AN INTRACORTICAL ELECTRODE ARRAY" IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING,US,IEEE INC. NEW YORK, vol. 38, no. 8, 1 August 1991 (1991-08-01), pages 758-767, XP000260760 ISSN: 0018-9294 the whole document	1,10,16, 20,23,28
A	JONES K E ET AL: "A MULTIPLEXING/DEMULTIPLEXING SYSTEM FOR USE WITH AN INTRACORTICAL ELECTRODE ARRAY" PROCEEDINGS OF THE ANNUAL INTERNATIONAL CONFERENCE OF THE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY,US,NEW YORK, IEEE, vol. CONF. 14, 29 October 1992 (1992-10-29), pages 1394-1395, XP000378733 the whole document	1,10,16, 20,23,28

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 00/01374

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4969468 A	13-11-1990	US 4837049 A	06-06-1989
		EP 0272308 A	29-06-1988
		WO 8707825 A	30-12-1987
US 5935155 A	10-08-1999	AU 3077099 A	27-09-1999
		EP 1061874 A	27-12-2000
		WO 9945870 A	16-09-1999

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ABSTRACT JP2022050711A

[0001]

13 [Problem] To provide a probe that enables effective beauty treatment by combining a beauty device that mainly uses the thermal effect of radio waves and a beauty device that mainly uses suction and rollers to obtain a massage effect. shall be. [Solution] In order to solve the above problems, the beauty device of the present invention includes a probe including a head portion in which a plurality of electrodes 6 and a roller 7 are arranged, a control circuit for supplying current, and a suction pump. and a pump drive circuit, the beauty device providing a thermal effect, wherein the plurality of electrodes 6 are arranged at the edge of the head part and are arranged on both sides of the rotation axis of the roller 7. , are arranged adjacent to each other near the rotation axis, and the roller 7 and the human body are in contact with each other when the suction pump is driven by the pump drive circuit and the probe suctions the human body. It is characterized by giving a massage effect. [Selection diagram] Figure 5

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(P2022-50711A)
(43)公開日　令和4年3月30日(2022.3.30)

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A61H 7/00 (2006.01)		A61H	7/00	310H
A61H 15/02 (2006.01)		A61H	15/00	390A
A61N 1/06 (2006.01)		A61H	15/02	
		A61N	1/06	

審査請求　有　請求項の数　2　OL　(全10頁)

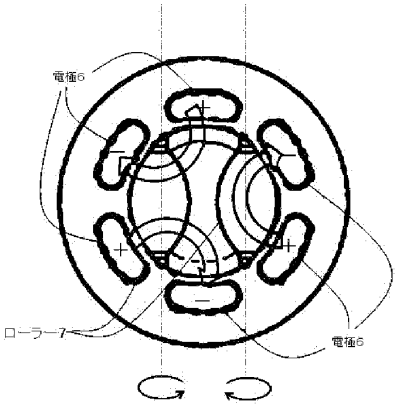
(21)出願番号　特願2022-12544(P2022-12544)
(22)出願日　令和4年1月31日(2022.1.31)
(62)分割の表示　特願2017-173447(P2017-173447)の分割
原出願日　平成29年9月8日(2017.9.8)

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最終頁に続く

(54)【発明の名称】　美容器

(57)【要約】
【課題】主にラジオ波による温熱効果を利用した美容器と主に吸引とローラーを用いたマッサージ効果を得られる美容器を組み合わせた効果的な美容を可能とするプローブを提供とすることを課題とする。
【解決手段】前記課題を解決するために、本発明の美容器は、複数の電極６と、ローラー７とが配置されたヘッド部を備えたプローブと、電流を供給する制御回路と、吸引ポンプと、ポンプ駆動回路と、を有し、温熱効果を提供する美容器であって、前記複数の電極６は、前記ヘッド部の縁部に配置されるとともに、前記ローラー７の回転軸を挟んで、互いに隣接して前記回転軸付近に配置されたものであって、前記ポンプ駆動回路によって前記吸引ポンプが駆動されて前記プローブが前記人体を吸引した状態で前記ローラー７と前記人体が接触してマッサージ効果を与えることを特徴とする。
【選択図】図５



ローラー回転方向

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【特許請求の範囲】
【請求項１】
電流を人体に供給するための複数の電極と、人体に接触可能なローラーと、が配置されたヘッド部を備えたプローブと、
前記電流として高周波による電流を供給する制御回路と、
前記ヘッド部内部の空気を吸引する吸引ポンプと、
前記吸引ポンプを駆動するポンプ駆動回路と、を有し、前記高周波による温熱効果を提供する美容器であって、
前記複数の電極は、前記ヘッド部の縁部に配置されるとともに、前記ローラーの回転軸を挟んで、互いに隣接して前記回転軸付近に配置されたものであって、
前記ポンプ駆動回路によって前記吸引ポンプが駆動されて前記プローブが前記人体を吸引した状態で前記ローラーと前記人体が接触してマッサージ効果を与えることを特徴とする美容器。
【請求項２】
電流を人体に供給するための複数の電極と、人体に接触可能なローラーと、が配置されたヘッド部を備えたプローブと、
前記電流として高周波による電流を供給する制御回路と、
前記ヘッド部内部の空気を吸引する吸引ポンプと、
前記吸引ポンプを駆動するポンプ駆動回路と、を有し、前記高周波による温熱効果を提供する美容器であって、
前記複数の電極は、前記ヘッド部の縁部に配置されるとともに、前記ローラーの回転軸の一方の側に、互いに隣接して配置されたものであって、
前記ポンプ駆動回路によって前記吸引ポンプが駆動されて前記プローブが前記人体を吸引した状態で前記ローラーと前記人体が接触してマッサージ効果を与えることを特徴とする美容器。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、高周波による温熱作用を利用した美容器および吸引とローラーを用いた物理的なマッサージ効果を利用する美容器に係り、両者を一体化したプローブを実現することで、両方の作用による痩身効果が効果的に得られる美容器に係る。
【背景技術】
【０００２】
熱エネルギーを人体に照射することで、組織に作用して新陳代謝を亢進し、血行を促進して美容効果が得られることは公知である。熱エネルギーの人体への提供は電熱線で構成されるヒーターによる赤外線照射、超音波振動子からの超音波照射、発振回路で実現される、超短波、ラジオ波、マイクロ波の照射等各々の方法、あるいはこれらを組み合わせた美容器が実現されている。一方、痩身を目的として、マッサージ効果を利用した美容機器が実現されている。マッサージ効果としてはローラー回転あるいはポンプ等の吸引を利用した物理的なマッサージ効果によって組織の代謝を高め、いわゆるセルライトを解消する美容機器や、皮膚に高周波の電流（以下、単に高周波又はラジオ波という）を流し、通電・通電休止のパターンを複数電極間で入れ替えることで電流刺激によって叩かれるような刺激を与える物理的なマッサージ効果と同等の作用を実現する美容機器も存在する。
【０００３】
このような公知技術に基づく治療器としては特許文献１に開示されるものがある。特許文献１ではマッサージ効果は８０ｋＨｚ～１００ｋＨｚの高周波数の電気刺激によるものであり、複数電極の通電・休止する時間を交互に入れ替えることで、マッサージ効果を実現している。さらに、文献１では、４００ｋＨｚ～８００ｋＨｚの周波数の電流を流すことで、温め効果を得るための電極が別に設けられ、美容効果を高めるとされている。特許文献２では、ローラーおよび吸引機能によってマッサージ機能を備え、さらに、ローラーを

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電極として低周波数（～１ｋＨｚ）から高周波数（３ｋＨｚ～）までの電気刺激信号を皮膚から与える方法としている。

【０００４】

上記特許文献１に開示される美容器の場合、高周波を流す電極を４ｎ（ｎ＝１以上）としてプローブ先端に配置して、襷掛けのように斜め方向に位置する二つの電極ごとにプラス極、マイナス極を入れ替えるように電圧制御を行うことで、リズム感のある皮膚への電気刺激がマッサージ効果をもたらすようにしている。しかしながら、皮膚への電気刺激を、ある程度抑制されたものとするために、例えば９０ｋＨｚの高周波が用いられており、低周波刺激やローラー吸引ほど効果は得られない。また、一定の温熱効果を与えることはできるが、ラジオ波に比べるとその効果は小さい。

【０００５】

一方、上記特許文献２に開示される美容器の場合、ローラーの転動とポンプ吸引によるマッサージ効果に加えて、ローラーそのものを電極として電気刺激を与えるが、文献１と同様、電気刺激によるマッサージ効果を目的としたものであり、温熱効果を目的としたものではない。この場合、ローラーそのものを電極とすることで制御回路と電気的に接続する必要があり、洗浄が必要な取り外し可能なローラーに対する信号供給は、構成が複雑化し、回転体のため所定のマッサージ効果を得るための制御も複雑になる。

【先行技術文献】

【特許文献】

【０００６】

【特許文献１】ＷＯ２０１５／０６８６２１号公報

【特許文献２】ＷＯ２０１７／０３８８２２号公報

【発明の概要】

【発明が解決しようとする課題】

【０００７】

本発明は、上記問題に鑑み、電気刺激とマッサージ効果を組み合わせた美容器、例えば、主にラジオ波による温熱効果を利用した美容器と主に吸引とローラーを用いたマッサージ効果を得られる美容器を組み合わせた効果的な美容を可能とするプローブを提供とすることを課題とする。

【課題を解決するための手段】

【０００８】

前記課題を解決するために、本発明に基づく美容器は、電流を人体に供給するための複数の電極と、人体に接触可能なローラーと、が配置されたヘッド部を備えたプローブと、前記電流として高周波による電流を供給する制御回路と、前記ヘッド部内部の空気を吸引する吸引ポンプと、前記吸引ポンプを駆動するポンプ駆動回路と、を有し、前記高周波による温熱効果を提供する美容器であって、前記複数の電極は、前記ヘッド部の縁部に配置されるとともに、前記ローラーの回転軸を挟んで、互いに隣接して前記回転軸付近に配置されたものであって、前記ポンプ駆動回路によって前記吸引ポンプが駆動されて前記プローブが前記人体を吸引した状態で前記ローラーと前記人体が接触してマッサージ効果を与えることを特徴としている。

【０００９】

また、本発明による美容器は、電流を人体に供給するための複数の電極と、人体に接触可能なローラーとが配置されたヘッド部を備えたプローブと、前記電流として高周波による電流を供給する制御回路と、前記ヘッド部内部の空気を吸引する吸引ポンプと、前記吸引ポンプを駆動するポンプ駆動回路と、を有し、前記高周波による温熱効果を提供する美容器であって、複数の前記電極は、前記ヘッド部の縁部に配置されるとともに、前記ローラーの回転軸の一方の側に、互いに隣接して配置されたものであって、前記ポンプ駆動回路によって前記吸引ポンプが駆動されて前記プローブが前記人体を吸引した状態で前記ローラーと前記人体が接触してマッサージ効果を与えることを特徴とする美容器。

【発明の効果】

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【００１０】
上記構成を有する本発明により、温熱効果とマッサージ効果を同時に実現できると共に、ローラーおよび吸引機能に電極を付加する構成で比較的簡単な構成によって、より効率的な施術や治療を行うことができる。
【００１１】
また、ローラーの回転方向と電極による電気力線が直交することから、広く均等に温めた領域に効果的なマッサージ効果を与えることが可能になった。
【００１２】
また、ローラーの位置を接触面よりもプローブ内部側に配置することで、皮膚に対して手でもみだすようなタッピング効果を得ることができる。さらに、ローラーの回転軸方向に広く均等に温めた領域に効果的なマッサージ効果を与えることが可能になった。
【図面の簡単な説明】
【００１３】
【図１】本発明の実施形態の美容器の構成全体図
【図２】本発明の実施形態の美容器本体１の実現図
【図３】本発明の実施形態の美容器のプローブのヘッド構造図
【図４】本発明の実施形態の美容器のプローブの動作の説明図
【図５】本発明の実施形態の美容器のプローブの動作の実現例
【図６】本発明の実施形態の美容器のプローブ（小）の実現例
【発明を実施するための形態】
【００１４】
以下、本発明の実施の形態を添付図面に基づいて説明する。
【００１５】
図１は、本発明の実施形態の美容器の構成図である。美容器本体１とプローブ５から構成され、美容器本体１には、プローブ５の電極６に対してラジオ波を流すための制御回路（以下、ＲＦ制御回路２）、吸引のためのポンプ（以下、吸引ポンプ３）、ポンプを駆動するための駆動回路（以下、ポンプ駆動回路４）が各々存在している。ＲＦ制御回路２およびポンプ駆動回路４は、互いに独立した制御を行う構成でも良いし、例えば吸引ポンプの吸引パターンに同期して吸引ＯＮ時にラジオ波出力ＯＮ、吸引ＯＦＦ時にラジオ波出力ＯＦＦなど、連携動作する構成であっても良い。その場合は、図示されない信号線が、ＲＦ制御回路２とポンプ駆動回路４の間に設けられ、適切に制御される。ラジオ波および吸引・もみだし効果を提供するプローブ５は、美容器本体１に接続される。プローブ５は、後述する電極６およびローラー７から構成される。また、必要に応じて小型プローブ１１（後述）に交換可能なように取り外し可能な構造をとる。
【００１６】
図２は、美容器本体１の６面図である。（ａ）は上面図、（ｂ）は左側面図、（ｃ）は底面図、（ｄ）は正面図、（ｅ）は右側面図、（ｆ）は背面図を示している。本体内部には、ＲＦ制御回路２、吸引ポンプ３、ポンプ駆動回路４が格納されている。ＲＦ制御回路からの信号を供給する信号線および吸引ポンプの吸い込みホースと一体化した図示されないケーブルによってプローブ５と接続される。美容器本体１は、本実現例のように操作が容易なように縦型とし、本体上部にはタッチパネル等の操作用モニタおよび下部に車輪を取り付け、移動可能とする構造であっても良い。例えば、美容器本体１には、上記の吸引ポンプ３の出力制御および電極６からのラジオ波の出力制御を可能とするボタン、あるいは回転スイッチを備える。使用者の状態、体感に合わせて、適切な美容施術を施すための設定が可能となる。
【００１７】
図３は、本発明の実施形態の前記プローブ５の構成を示す図であり、ラジオ波を出力する電極６と、皮膚にもみだし効果を与えるためのローラー７を含んで構成される。（ａ）は上面図、（ｂ）は左側面図、（ｃ）は底面図、（ｄ）は正面図、（ｅ）は右側面図、（ｆ）は背面図を示している。電極６は、正極、負極のペアの隣接配置を基本構成として、皮

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膚との接触面であるプローブ５の縁に複数構成配置される。本実施形態では、電極６を６個、すなわち正極－負極のペアを３構成備えた構成としている。ローラー７は、電極間の電気力線とローラーの回転方向が直交するように配置される。一般的に、ＲＦによる温熱効果を利用した美容器では、皮膚にゲルを塗布してプローブ５を移動しながら皮膚にあてる使用法となるため、使用後は洗浄される。従って、ローラー７も取り外し可能な比較的簡単な軸止め構造で実現される。また、吸引ポンプ３による吸い込み動作に対して空気漏れを防止するため、電極の根本に図示しないパッキンを備えている。以上のように、比較的簡単な構造でプローブ５は実現されうる。尚、電極６の位置は、プローブ５の縁に限定されず、少なくとも吸引時に皮膚に接触できる位置であれば良く、例えばプローブ５の縁の内側、すなわち、プローブ５を人体に接触した場合に、人体とプローブによって構成される空間内部であって、吸引時に皮膚が接触する位置であれば良い。特に、電極６とローラー７の位置関係として、電極６によって決定される面に対して、人体と反対側にローラー７が配置されていても良い。あるいは、各電極６よりも人体（皮膚）から離れる位置にローラー７が配置されていても良い。電極６とローラー７との位置関係がこれと異なる場合は、皮膚がローラーによって押し付けられて電極との接触が不十分となりやすく、所定の電流値が得られなくなり、十分な温感が得られない。あるいは、電極６とローラー間に電流が集中するので、高周波による効果が、電流が集中した範囲に限定される。従って、いずれの場合も高周波の効果や施術の効果を低下させることとなる。ところが、本発明では電極６とローラー７の位置関係を上記のようにしているので、電極６による高周波の付与をローラー７が阻害することがなく、広い範囲でより効率の良い高周波の効果を皮膚に供給できる。

【００１８】

図４は、前記プローブ５のヘッド部分を構成する電極６、ローラー７の位置を示す断面図で、電極６は、被施術者の肌面１０が接触するヘッド部分の縁に配置され、ラジオ波が該電極６より放射されることで肌面１０は温められる。皮膚に接触する面に対して、該ローラー７は、プローブの内部側に配置される。吸引ポンプ３による吸引動作によって、ヘッド部分の上方から空気がヘッド内部の空気が吸引され、負圧が生じる。皮膚との間に空隙を作ることで、吸引ポンプ３による吸引動作の際、皮膚が持ち上がり、ポンプ吸引によって、回転可能なローラーと接触する。この状態で、プローブ５を図４の紙面上の左右に動かすことによってローラー７と皮膚との接触面が皮膚に従動し、回転するので、ポンプ駆動回路４において吸引ポンプ３の吸引圧力およびＯＮ、ＯＦＦの周期動作を適切に制御することで、使用者の皮膚に対してもみだし動作と呼ばれるタッピング効果を得ることが可能となる。

【００１９】

ＲＦ制御回路２は、一般的には周波数３００ｋＨｚ～５ＭＨｚのラジオ波を、電極６を介して人体に対して流すことで放射された領域の組織を温めるための回路である。例えば、本発明では、周波数８００ｋＨｚのラジオ波を流すことで実現している。電極６へのラジオ波の供給パターンは複数の正極－負極のペア構成に対して同一のパターンで供給しても良いし、正極－負極を入れ替えるパターン、出力を変動させるパターン等様々な制御を行っても良い。

【００２０】

ポンプ駆動回路４は、吸引ポンプ３の吸引圧力、ＯＮとＯＦＦの時間を任意に設定することで、使用者個人の感覚に合わせてタッピング感覚を得ることが可能である。設定パラメータとして、吸引圧力に関しては最大値、吸引パターンに関しては、連続吸引、ＯＮ－ＯＦＦのパターン（ＬＯＷ、ＭＩＤ、ＨＩＧＨ等）を本体から設定可能としている。

【００２１】

ローラー７は、プローブの先端にあって回転することから、図のように紡錘形が望ましい。皮膚に直接触れることから、人体に影響のない、耐水性のある材質であれば、いずれも使用できる。例えば、合成樹脂、プラスチック等でも良い。

【００２２】

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電極６は、ラジオ波を人体に放射するためであり、一般にはステレンスやニッケル等の導電性金属で、ローラー同様に人体に触れても影響なく、耐水性のある材質が選択される。

【００２３】

美容器本体１には、上記の吸引ポンプ３の出力制御および電極６からのラジオ波の出力制御を可能とするボタン、あるいは回転スイッチを備える。使用者の状態、体感に合わせて適切な美容施術を施すための設定が可能となる。

【００２４】

図６は、比較的狭い面に対して施術を施すための小型プローブ１１である。（ａ）は上面図、（ｂ）は左側面図、（ｃ）は底面図、（ｄ）は正面図、（ｅ）は右側面図、（ｆ）は背面図を示している。この場合、電極は同様に６個（３対）構成である。ローラーについては小型化の場合、１個でもみだし効果を得ることができる。

【００２５】

図３、図６で実現されるプローブでは、図４に示すように電極６の各々正極負極からのラジオ波が人体に放射されることで熱に変換され、脂肪燃焼効果が得られる。電極間の電気力線が通過する範囲に対して、およそ皮下２ｃｍ程度まで温められ効果があるとされる。このとき、正負の電極からの電気力線に対してローラーの回転方向が直交方向となるため、温められた範囲をカバーするように吸引操作が行われることになり、大きな痩身効果が得られる。一方、電極で形成される電気力線がローラーの回転方向と平行となるように配置されるためには、ローラーを挟むように電極が配置されることになり、電極の配置の自由度が低下するだけでなく、電流路が長くなるので十分な電流を供給するための電圧値が大きくなって望ましくない。あるいは、吸引を行うので、皮膚がプローブ内部に部分的に引き込まれて、湾曲した部分が発生することとなるが、当該湾曲部分には十分な電流が供給されないこととなり、高周波の効果が得られにくくなる。または、ローラーの回転方向と電気力線が平行となる場合は、複数の電流路が並列に構成され、異なる高周波の効果が得られたところにローラーによって施術が施されることになるので、施術部分に効果のムラが発生しやすくなる。ところが、本発明では、図５のようにローラーの回転方向と電気力線が直交するような配置とするので、ローラーと電極の配置に自由度が向上する。あるいは、吸引による湾曲部分の影響がなく均一な電流を供給できる。または、ローラーの軸方向においては電流量が一定となり、高周波による一様な効果が得られる部分にローラーによる施術がされるので、均一な効果をえることができる。

【００２６】

次に、上記のように構成された、本発明の実施形態の治療器の使用例について説明する。本発明は、使用する電気刺激の周波数や出力や吸引する強度を変更することによって医療機器としても使用可能である。治療器の使用について、機器の使用方法は美容器と治療器に特に差はないので美容器の使用として説明することができる。

【００２７】

本発明のプローブは、従来のエステサロンでのラジオ波を利用した美容器の使用法と基本的には同様となる。すなわち、美容施術を行う対象の皮膚の上にゲルを塗布し、プローブを接触させ一定の速度で動かしながらの使用となる。ゲルは、機器の熱が効率的に施術部位に伝わるような熱伝導率の高い材料が使用される他、さらに肌に対して引き締めなどに有効な成分を含んだ材料も合わせて使用される。施術部位が腹部や背中など比較的広い面積であれば、図２のプローブを使用することで、広い範囲に対して効率的に痩身効果を得ることが可能となる。一方、上腕部や脛部、ピンポイントで施術を施したいのであれば、図６の小型プローブ１１に交換することができる。

【００２８】

本発明の美容器または治療器は電源スイッチを入れて、吸引の出力レベルおよび動作パターン、ラジオ波の出力レベルを設定する。吸引レベルは、例えば最大４０ｋＰａ、医療器では、最大で６０ｋＰａでＬＯＷ、ＭＩＤ、ＨＩＧＨを選択する。さらに、回転スイッチで実現する調整ボリュームで微調整を可能としても良い。吸引パターンは、連続、間欠（Ｆａｓｔ、Ｍｉｄ、Ｓｌｏｗ）を美容器本体１のボタンで選択する。ラジオ波は、例えば

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周波数８００ｋＨｚ、最大レベル２５０Ｖ、医療器では最大で２ＭＨｚ、３５０Ｖが設定される。レベルについては、美容器本体１のボタンで１、２、３、４、５など、例えば２０Ｖ刻みで設定できるようにしても良いし、調整ボリュームで微調整を可能としても良い。痩身に効果的な温度、もみだし感覚が得られるように適切な設定とする。

【００２９】

また、プローブに出力ボタンを設けて、施術者が手動で吸引、ラジオ波の出力のＯＮ、ＯＦＦをコントロールしても良い。吸引、ラジオ波が同期する制御であっても良いし、各々独立にＯＮ、ＯＦＦ可能であっても良い。

【００３０】

尚、ラジオ波については事故防止のため、肌接触検知を行い、非接触時は出力しないようにするのが望ましい。

【００３１】

本発明の美容器によると、ラジオ波（ＲＦ）による熱効果に基づく脂肪燃焼と吸引による痩身効果の向上を同時に行う施術において、より効率的な効果が得られることになる。本発明ではラジオ波が作用する領域である電極間に対してローラーが直交に作用するので広い面積にわたってもみだし効果が得られ、吸引を行わない場合より、より深いところまで皮膚下にラジオ波が作用する。従来では、吸引とラジオ波を同時に作用させる機器はあっても吸引のローラーが実装されておらず、もみ出しの効果が弱いこと、およびラジオ波が作用する領域に効率的に吸引によるもみ出し効果を得ることができないが、本発明では効率的な痩身効果が得られるので、施術時間を短くして効率を向上させることができる。

【００３２】

さらに、被施術者の状態に応じて、吸引によるもみ出しのパターンや、ラジオ波の出力レベルを変更する、あるいは、ラジオ波と吸引を同時に行い、続けてラジオ波のみ、吸引のみと施術方法を組み合わせることで効率的な施術を行うことが可能である。

【００３３】

本発明では、プローブ先端の電極を６つとしているがこれに限定されるものではない。プローブの先端部分のサイズに合わせて増減させることも可能である。すなわち、正極、負極のペア数ｎを単位として、２ｎ個としても良いし、奇数個の電極でプローブを構成しても良い。電極からの電気力線の直交方向にローラーの回転方向が一致する配置で電極およびローラーを配置することでラジオ波による温め効果とローラー吸引によるもみ出し効果の相乗効果を効率的に得ることができる。例えば、ローラーのみを有するプローブを一定時間使用し、その後にラジオ波のみによる施術を行った場合（両方別々に施術した場合）と比較すると、本発明のプローブを使用すると当該一定時間より短い時間で、両方別々に施術したよりも高い効果をえることができる。

【００３４】

尚、図示の実施形態はあくまで本発明を例示するものであり、本発明は、説明した実施形態により直接的に示されるものに加え、特許請求の範囲内で当業者によりなされる各種の改良・変更を包含するものであることは言うまでもない。例えば、本発明は美容器に限定されるものではなく、マッサージ器やリラクゼーション用の機器あるいはその他の機器にも適用することができる。さらに、使用する電気刺激として、高周波数の電気刺激に限定されず、所望の効果が得られるものであれば低周波数の電気刺激であっても良い。あるいは、上記の実施形態では吸引ＯＮと同時に高周波をＯＮし、吸引ＯＦＦにより高周波をＯＦＦとしているがこれに限定されず、吸引ＯＮが複数回実行されるとラジオ波がＯＮされるような構成でも良く、吸引ＯＮが複数回実行されるとラジオ波がＯＦＦされるような構成でも良く、吸引ＯＮ時にラジオ波出力ＯＦＦ、吸引ＯＦＦ時にラジオ波出力オンとしても良いし、吸引パターンに関係なくラジオ波をＯＮとしても良い。

【００３５】

本発明に他の形態に基づくプローブは、電流を人体に供給するための複数の電極と、人体に接触可能なローラーを備え、前記電極からの電気力線がローラーの回転方向と直交成分を有することを特徴としている。あるいは、プローブの先端の皮膚との接触部位に円環状

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に配置された複数の電極を備え、前記電極から高周波を使用者の皮膚に流すことができるとともに、前記電極からの電気力線に対して直交方向に配置されたローラー、前記電極にラジオ波を流すための制御回路、皮膚を吸い上げるための吸引ポンプ、ポンプを駆動するためのポンプ駆動回路、を含んで構成されるものであり、より具体的にはラジオ波による温熱効果とローラーおよび吸引による物理的なマッサージの両方の機能を備えた美容器であって、前記美容器内部にはＲＦ波制御回路、吸引ポンプ、ポンプ駆動回路を備え、使用者の皮膚に接触するプローブ先端の電極から高周波を流し温熱効果を得るとともに、前記電極からの電気力線とは直交方向にローラーが回転することで効果的な美容効果を得ることができる。

【００３６】

また、本発明によるプローブは、電流を人体に供給するための複数の電極と、人体に接触可能なローラーを備え、前記複数の電極によって決定される面に対して前記人体と反対側に前記ローラーが配置されていることを特徴とする。

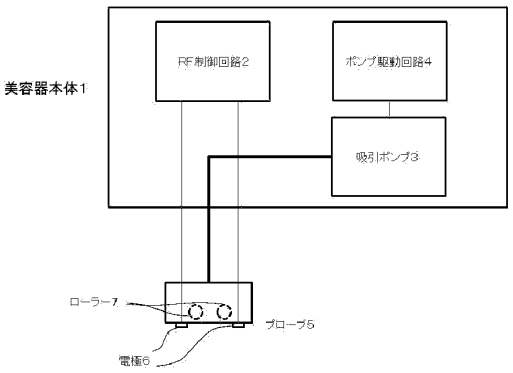
【符号の説明】

【００３７】

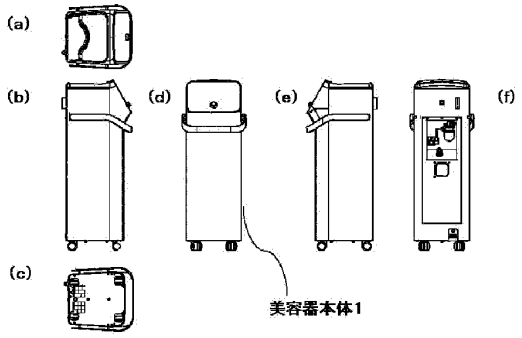
１…美容器本体
２…ＲＦ制御回路
３…吸引ポンプ
４…ポンプ駆動回路
５…プローブ
６…電極
７…ローラー
８…電極（小型）
９…ローラー（小型）
１０…肌面
１１…小型プローブ

【図面】

【図１】

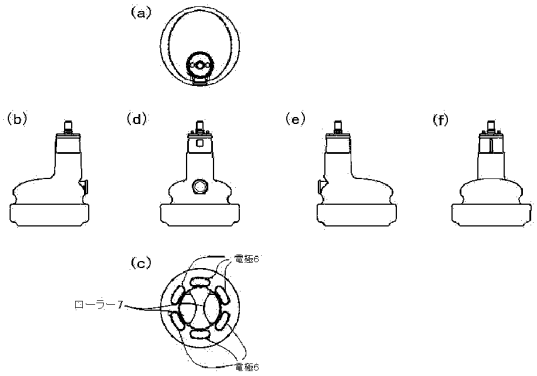


【図２】

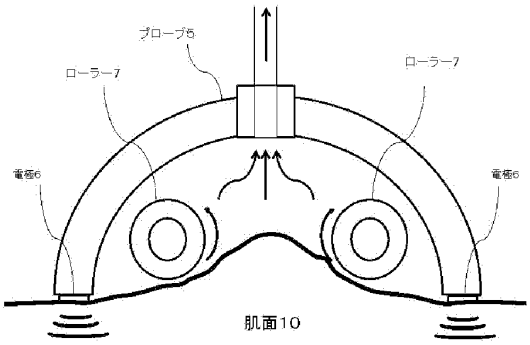


Petitioner Therabody Ex-1004, 0515

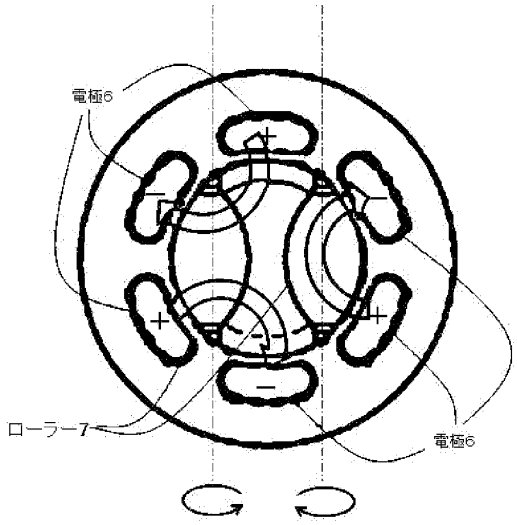
【図３】



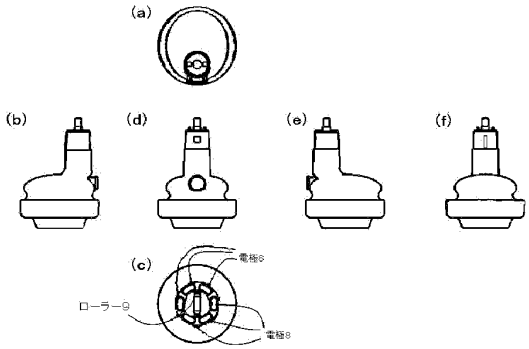
【図４】



【図５】



【図６】



Petitioner Therabody Ex-1004, 0516

フロントページの続き

東京都千代田区神田佐久間河岸８４　サンユウビル４０１　有限会社アオキデザイン内

Petitioner Therabody Ex-1004, 0517

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PHC001-0001	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 18/56814	International filing date *(day/month/year)* 22 October 2018 (22.10.2018)	(Earliest) Priority Date *(day/month/year)* 23 October 2017 (23.10.2017)
Applicant PATENT HOLDING COMPANY 001, LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1A

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 18/56814

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61N 1/04, A61B 5/04 (2019.01)
CPC - A61B 5/0002, A61B 5/0015, A61B 5/04001, A61N 1/0456, A61N 1/0492, A61N 1/36014, A61N 1/36017, G06F 3/011, G06F 3/015, G06F 3/016

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History Document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See Search History Document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2016/0129248 A1 (CREASEY et al.) 12 May 2016 (12.05.2016), FIGS. 4, 18-19; para [0003], [0024]-[0028], [0032]-[0039], [0044]-[0047], [0052]-[0060], [0062], [0066], [0077]-[0078], [0098]-[0093], [0106]-[0107]	1, 2, 8, 12, 13, 22, 23, 30, 32-35, 37, 38, 47, 50-52, 63
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Y		3-7, 9-11, 14-21, 24-29, 36, 48, 49, 53-62, 64-70
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A		39-46
Y	US 2010/0145425 A1 (JUNG et al.) 10 June 2010 (10.06.2010), para [0024], [0026], [0029], [0031]	3-7, 29
Y	US 9,582,035 B2 (CONNER) 28 February 2017 (28.02.2017), FIG. 29, 40; col. 5 lns 58-59, col. 11 lns 15-29, lns 61-63, col. 12 lns 9-18, lns 51-61, col. 28 lns 13-26, col. 37 lns 55-60, col. 46 lns 64-66, col. 55 lns 19-30, lns 26-30, col. 63 lns 14-38, col. 71 lns 49-58, col. 83 lns 55-63, col. 88 lns 59-62, col. 94 lns 23-29, col. 116 lns 62-66, col. 127 lns 55-56, col. 152 lns 9-15, col. 190 lns 35-39, col. 206 lns 60-67, col. 207 lns 1-3	9-11, 14-21, 24-29, 53-62, 64-70
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A		39-46
Y	US 5,627,548 A (WOO et al.) 06 May 1997 (06.05.1997), FIG. 1; col. 1 lns 49-50	36
Y	US 2013/0202674 A1 (ERICSON) 08 August 2013 (08.08.2013), para [0079], [0092], [0096], [0104], [0157]	48, 49
Y	US 2014/0172062 A1 (YOON) 19 June 2014 (19.06.2014), para [0018], [0067], [0077],	4-7

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 February 2019	22 FEB 2019
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: MATTHEW ROBERT LEAPER
1629 K STREET NW, SUITE 300
WASHINGTON, DC 20006

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	22 FEB 2019
Applicant's or agent's file reference PHC001-0001	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 18/56814	22 October 2018 (22.10.2018)	23 October 2017 (23.10.2017)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - A61N 1/04, A61B 5/04 (2019.01)
CPC - A61B 5/0002, A61B 5/0015, A61B 5/04001, A61N 1/0456, A61N 1/0492, A61N 1/36014, A61N 1/36017, G06F 3/011, G06F 3/015, G06F 3/016

Applicant PATENT HOLDING COMPANY 001, LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	12 February 2019	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 18/56814

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [x] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 18/56814

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	3-11, 14-21, 24-29, 36, 39-46, 48, 49, 53-62, 64-70	YES
	Claims	1, 2, 12, 13, 22, 23, 30, 32-35, 37, 38, 47, 50-52, 63	NO
Inventive step (IS)	Claims	39-46	YES
	Claims	1-30, 32-38, 47-70	NO
Industrial applicability (IA)	Claims	NONE	YES
	Claims	1-30, 32-70	NO

2. Citations and explanations:

Claims 1, 2, 12, 13, 22, 23, 30, 32-35, 37, 38, 47, 50-52 and 63 lack novelty under PCT Article 33(2) as being anticipated by US 2016/0129248 A1 to Creasey et al. (hereinafter Creasey).

Regarding Claim 1, Creasey discloses a communication device (para [0003]: This invention pertains to the activation of nerves by topical stimulators to control or influence muscles, tissues, organs, or sensation, including pain, in humans and mammals.; para [0062]) comprising: a body comprising a distal surface compatible with skin (as depicted in FIG. 16; para [0032]: The topical nerve stimulator/sensor (TNSS) is a device to stimulate nerves and sense the actions of the body that can be placed on the skin of a human or mammal); a tissue interface on the distal surface (an enclosure of matrix 1860 depicted in FIG. 18), the tissue interface comprising a plurality of energy generators (para [0052]: one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regimen), each energy generator being operable to output a plurality of energies in a signal direction toward the skin (para [0077]: An example 10.~10 matrix of electrical contacts 1860 is shown. By varying the pattern of electrical contacts 1860 employed to cause an electric field 1820 to form and by time varying the applied electrical power to this pattern of contacts 1860, it is possible to steer the field 1820 across different parts of the body, which may include muscle 1870, bone, fat, and other tissue, in three dimensions.); an attachment element (adhesive conductive pads) configured to maintain the tissue interface against the skin (para [0053]: In one or more examples, a Smart Band Aid incorporating a battery and electronic circuit and electrodes in the form of adhesive conductive pads may be applied to the skin, and electrical stimuli is passed from the adhesive pads into the tissues.); and a processing unit (control unit 402 of FIG. 4) configured to communicate with nerves associated with the skin during (para [0052]: Referring to FIG. 4, the TNSS has one or more electronic circuits or chips that perform the functions of: communications with the controller, nerve stimulation via one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regimen) by receiving input data from a data source (para [0039]: Stimulators are protocol controlled initiators of electrical stimulation, where such protocol may reside in either the TNSS and/or the controller and/or the cloud. Stimulators interact with associated sensors or activators, such as electrodes or MEMS devices; para [0052]: Within this is shown a control unit 402 for data processing, communications and storage and one or more stimulators 404 and sensors 406 that are connected to electrodes 408.cElectronic circuits and chips will communicate with each other via conductive tracks within the device capable of transferring data and/or power.) and causing the plurality of energy generators to output an energy signal in the signal direction with one or more energies of the plurality of energies (para [0052]: Referring to FIG. 4, the TNSS has one or more electronic circuits or chips that perform the functions of: communications with the controller, nerve stimulation via one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regiment; para [0059]: Each electrode may consist of a plurality of conductive contacts that give the electrode abilities to adjust the depth, directionality, and spatial distribution of the applied electric field.).

Regarding Claim 2, Creasey discloses the device of claim 1. Creasey further discloses, wherein the body is flexible (para [0056]: the Smart Band Aid. Packaging Platform consists of an assembly of an adhesive patch capable of being applied to the skin and containing the TNSS Electronics, protocol, and power described above; para [0058]: For example, neural stimulator 800, sensor 802, processor/ communications 804 are represented. The chips can be packaged separately on a substrate, including a flexible material, or as a system-on-chip (SOC) 400).

Regarding Claim 12, Creasey discloses the device of claim 1. Creasey further discloses, wherein the input data comprises a measurement, and the processing unit is configured to modify the energy signal based on the measurement (para [0035]: Sensing will be used to measure the effects of stimulation. The measurements sensed will be used to specify the next stimulation).

Regarding Claim 13, Creasey discloses the device of claim 12. Creasey further discloses, wherein the processing unit is configured determine a change of the measurement and modify the energy signal based on the change of the measurement (para [0033]: the controller or the cloud, has several functions including: (1) sending activation or disablement signals between the controller and the TNSS via a local network such as Bluetooth; (2) driving the user interface, as when the controller receives commands from the user and provides visual, auditory or tactile feedback to the user; (3) analyzing TNSS data, as well as other feedback data such as from the user, within the TNSS, and/or the controller and/or the cloud; (4) making decisions about the appropriate treatment; (5) system diagnostics for operational correctness; and (6) communications with other controllers or users via the Internet cloud for data transmission or exchange).

-- see next page

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 18/56814

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
There is no claim numbered as Claim 31 present in the Applicant's claim set.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 18/56814

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
-- Continuation of Box V --

Regarding Claim 22, Creasey discloses the device of claim 1. Creasey further discloses, wherein the data source comprises one or more data sources, and the processing unit is configured to (para [0032]: It consists of one or more controllers or Control Units, one or more TNSS modules, software that resides in Control Units and TNSS modules, wireless communication between these components, and a data managing platform. The controller hosts software that will control the functions of the TNSS.): receive the input data from the one or more data sources (para [0066]: TNSS protocol performs the functions of communications with the controller including transmitting and receiving of control and data signals, activation and control of the neural stimulation, data gathering from on board sensors, communications and coordination with other TNSSs, and data analysis; para [0032]: It consists of one or more controllers or Control Units, one or more TNSS modules, software that resides in Control Units and TNSS modules, wireless communication between these components, and a data managing platform); and generate a control signal based on the input data (para [0066]: Typically the TNSS may receive commands from the controller, generate stimuli and apply these to the tissues); and cause the plurality of energy generators to output the energy signal according to the control signal (para [0044]: Making decisions about the appropriate treatment. The protocol uses the data it analyzes to decide what stimulation to apply; para [0052]: nerve stimulation via one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regimen).

Regarding Claim 23, Creasey discloses the device of claim 22. Creasey further discloses, wherein the processing unit is further configured to: determine a change in the input data (para [0066]: Typically the TNSS may receive commands from the controller, generate stimuli and apply these to the tissues, sense signals from the tissues, and transmit these to the controller. It may also analyze the signals sensed and use this information to modify the stimulation applied.); and modify the control signal based on the change of the input data (para [0034]: The sensing provides information about the effects of stimulation, allowing the stimulation to be adjusted to a desired level or improved automatically; para [0066]: It may also analyze the signals sensed and use this information to modify the stimulation applied; para [0066]).

Regarding Claim 30, Creasey discloses the device of claim 1. Creasey further discloses, wherein the data source (storage of control unit 402 of FIG. 4) comprises a local sensor (sensors 406 of FIG. 4) that is attached to the body (para [0032]: The topical nerve stimulator/sensor (TNSS) is a device to stimulate nerves and sense the actions of the body that can be placed on the skin of a human or mammal to act on and respond to a nerve, muscle or tissue) and configured to output at least a portion of the input data (para [0060]: One or more TNSSs with one or more Controllers form a System. Systems can communicate and interact with each other and with distributed virtualized processing and storage services. This enables the gathering, exchange; para [0066]).

Regarding Claim 32, Creasey discloses the device of claim 1. Creasey further discloses, wherein the data source comprises at least one remote sensor (transmitter and receiver) (para [0047]: It also allows the topical device along with a remote control unit (communicating wirelessly via an antenna, transmitter and receiver) to function autonomously.) that is remote from the body and configured to output at least a portion the input data (para [0046]: Communications with other controllers or users via the Internet cloud for data transmission or exchange, or to interact with apps residing in the Internet cloud. The protocol communicates with other smartphones or people via the internet wirelessly; this may include sending data over the internet, or using computer programs that are operating elsewhere on the internet.; para [0037]; [0061]).

Regarding Claim 33, Creasey discloses the device of claim 32. Creasey further discloses, wherein the processing unit is configured to receive the input data from a server (cloud) (para [0032]: Finally, the controller provides communications with other Controllers or the Internet cloud.) in communication with the at least one remote sensor (para [0047]: It also allows the topical device along with a remote control unit (communicating wirelessly via an antenna, transmitter and receiver) to function autonomously; para [0061]).

Regarding Claim 34, Creasey discloses the device of claim 33. Creasey further discloses, wherein the at least one remote sensor comprises a health monitoring device (para [0092]-[0093]: Recording of optical information from the body: A Smart Band Aid. incorporating a light source (LED, laser) illuminates tissues and senses the characteristics of the reflected light to measure characteristics of value, e.g. oxygenation of the blood, and transmit this to a cellphone or other computer network. Recording of chemical information from the body: The levels of chemicals or drugs in the body or body fluids is monitored continuously by a Smart Band Aid. sensor and transmitted to other computer networks and appropriate feedback provided to the user or to medical staff. Levels of chemicals may be measured by optical methods (reflection of light at particular wavelengths) or by chemical sensors; para [0061]).

Regarding Claim 35, Creasey discloses the device of claim 1. Creasey further discloses, further comprising a power generator attached to the body (para [0054]: Referring to FIG. 5, limited lifetime battery sources will be employed as internal power supply 412, to power the TNSS deployed in this illustration as a Smart Band Aid.. These may take the form of Lithium Ion technology or traditional non-toxic MnO2 technologies; para [0051]).

Regarding Claim 37, Creasey discloses the device of claim 1. Creasey further discloses, wherein the one or more energies comprise: a first energy configured to communicate the energy signal (para [0059]: Referring to FIG. 9 SBAs with variations on arrangements of electrodes are shown. Each electrode may consist of a plurality of conductive contacts that give the electrode abilities to adjust the depth, directionality, and spatial distribution of the applied electric field. For all the example electrode configurations shown, 901-904, the depth of the electrical stimulation can be controlled by the voltage and power applied to the electrode contacts.); and a second energy configured to modify a penetration depth of the first energy (para [0059]: Each electrode may consist of a plurality of conductive contacts that give the electrode abilities to adjust the depth).

-- see next page

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 18/56814

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
-- Continuation of Box V --

Regarding Claim 38, Creasey discloses the device of claim 37. Creasey further discloses, wherein the first energy is communicable with a first portion of the nerves, and a second energy is communicable with a second portion of the nerves (para [0059]: Referring to FIG. 9 SBAs with variations on arrangements of electrodes are shown. Each electrode may consist of a plurality of conductive contacts that give the electrode abilities to adjust the depth, directionality, and spatial distribution of the applied electric field. For all the example electrode configurations shown, 901-904, the depth of the electrical stimulation can be controlled by the voltage and power applied to the electrode contacts; para [0062]: Electromagnetic radiation like light shows some properties of waves and can be focused on certain locations. This provides the opportunity to stimulate tissues such as nerves selectively. It also provides the opportunity to focus the transmission of energy and data on certain objects, including topical or implanted electronic devices, thereby not only improving the selectivity of activating or controlling those objects but also reducing the overall power required to operate them).

Regarding Claim 47, Creasey discloses the device of claim 1. Creasey further discloses, wherein the device is implantable (para [0062]: FIG. 11 shows a method for forming and steering a beam by the use of a plurality of radiators 1102 which are activated out of phase with each other by a plurality of phase shifters 1103 that are supplied power from a common source 1104. Because the radiated signals are out of phase they produce an interference pattern 1105 that results in the beam being formed and steered in varying controlled directions 1106. Electromagnetic radiation like light shows some properties of waves and can be focused on certain locations. This provides the opportunity to stimulate tissues such as nerves selectively. It also provides the opportunity to focus the transmission of energy and data on certain objects, including topical or implanted electronic devices, thereby not only improving the selectivity of activating or controlling those objects but also reducing the overall power required to operate them).

Regarding Claim 50, Creasey discloses the device of claim 1. Creasey further discloses, wherein: the plurality of energy generators are arranged in bands (columns or rows of the 10x10 matrix) (para [0059]: The next configuration, 902, shows electrodes 404 that are arranged in a plurality of parallel strips of electrical contacts. This allows the electric field to be oriented perpendicular or parallel to the SBA); the attachment element (adhesive conductive pads) is configured to maintain each band against the skin (para [0053]: In one or more examples, a Smart Band Aid incorporating a battery and electronic circuit and electrodes in the form of adhesive conductive pads may be applied to the skin, and electrical stimuli is passed from the adhesive pads into the tissues.); the input data comprises input data for each band (para [0077]-[0078]: By varying the pattern of electrical contacts 1860 employed to cause an electric field 1820 to form and by time varying the applied electrical power to this pattern of contacts 1860...an array of sensors (e.g. piezoelectric sensors or micro-electro-mechanical sensors) in a TNSS can actas a phased array antenna for receiving ultrasound signals, to acquire ultrasonic images of body tissues. Electrodes 1910 may act as an array of electrodes sensing voltages at different times and locations on the surface of the body, with software processing this information to display information about the activity in body tissues, e.g. which muscles are activated by different patterns of stimulation); and the processing unit is configured to communicate with nerves associated with the skin by causing the plurality of energy generators in each band to output a different energy signal based on the input data for each band (para [0078]: An array of sensors (e.g. piezoelectric sensors or micro-electro-mechanical sensors) in a TNSS can actas a phased array antenna for receiving ultrasound signals, to acquire ultrasonic images of body tissues. Electrodes 1910 may act as an array of electrodes sensing voltages at different times and locations on the surface of the body, with software processing this information to display information about the activity in body tissues, e.g. which muscles are activated by different patterns of stimulation; para [0060]: One or more TNSSs with one or more controllers form a system. Systems can communicate and interact with each other and with distributed virtualized processing and storage services. This enables the gathering, exchange, and analysis of data).

Regarding Claim 51, Creasey discloses the device of claim 50. Creasey further discloses, wherein: the body extends along a longitudinal axis (configuration 902, as depicted in FIG. 9); and the bands are spaced apart along the longitudinal axis (electrodes 404 of configuration 902, as depicted in FIG. 9).

Regarding Claim 52, Creasey discloses the device of claim 51. Creasey further discloses, wherein the body is configured to wrap around a limb so that the longitudinal axis of body is aligned with a longitudinal axis of the limb, and the bands wrap around the limb about the longitudinal axis (as depicted in FIG. 9 (configuration 902) and FIG. 19; para [0078]: FIG. 19 shows a example of stimulating and sensing patterns of signals in a volume of tissue. Electrodes 1910 as part of a cuff arrangement are placed around limb 1915. The electrodes 1910 are external to a layer of skin 1916 on limb 1915. Internal components of the limb 1915 include muscle 1917, bone 1918, nerves 1919, and other tissues.).

Regarding Claim 63, Creasey discloses a communication system (para [0033]: The controller communicates with the neurostim module, also called TNSS module or SBA, and also communicates with the user. In at least one example, both of these communications can go in both directions, so each set of communications is a control loop.) comprising: a plurality of communication devices according to claim 1 (para [0033]: communications with other controllers or users via the Internet cloud for data transmission or exchange, or to interact with apps residing in the Internet cloud.); and at least one processor that is in communication with the plurality of communication devices (para [0033]: the controller or the cloud, has several functions including:...communications with other controllers or users via the Internet cloud for data transmission or exchange, or to interact with apps residing in the Internet cloud.) and configured to: generate a corrective motion signal based on position data for the plurality of communication devices (para [0106]: Sensing the position and orientation of multiple limb segments is used to provide visual feedback on a smart phone of for example, a golf swing, and also mechanical or electrical feedback to the user at particular times during the swing to show them how to change their actions; para [0035]); and cause each communication device to output its energy signal (para [0031]: Nerves can also be stimulated mechanically to produce sensation or provoke or alter reflexes; this is the basis of touch sensation and tactile feedback) based on the corrective motion signal (para [0106]: Sensing the position and orientation of multiple limb segments is used to provide visual feedback on a smart phone of for example, a golf swing, and also mechanical or electrical feedback to the user at particular times during the swing to show them how to change their actions; para [0035]).

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Claim 8 lacks an inventive step under PCT Article 33(3) as being obvious over Creasey.

Regarding Claim 8, Creasey discloses the device of claim 1. Creasey further discloses, wherein the attachment element comprises an adhesive disposed on the distal surface of the body (para [0028]: Referring to FIG. 7 is a TNSS deployed as a Smart Band Aid(TM) 414. The Smart Band Aid(TM) has a substrate with adhesive on a side for adherence to skin), but does not specifically disclose a biocompatible adhesive. Although Creasey does not specifically disclose a biocompatible adhesive, it would have been obvious to one having ordinary skill in the art to recognize that the adhesive used by Creasey properly adheres to skin (see Creasey, para [0028]) without irritation or other negative consequence and thereby is considered a biocompatible adhesive.

Claim 3 lacks an inventive step under PCT Article 33(3) as being obvious over Creasey in view of US 2010/0145425 A1 to Jung et al. (hereinafter Jung).

Regarding Claim 3, Creasey discloses the device of claim 1. Creasey discloses the body (as depicted in FIG. 18), and each energy generator (para [0052]: one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regimen), but does not specifically disclose: wherein the body comprises a plurality of communication bays, and each energy generator is located in and configured to output the energy signal out of one of the communication bays. However, Jung discloses a body (glass fiber 210) (para [0024]: the electrode 20 for stimulating cranial nerves comprises a glass fiber 210 and a metal wire 220.) comprising a plurality of communication bays (holes) (para [0026]: The glass fiber 210 has first and second holes 211 and 212), and each energy generator (electrode) is located (para [0026]: The first and second holes 211 and 212 have preferably the diameters b in the range of 20um to 100um. If the diameters are in the stated range, upon insertion of an electrode into a fine cranial nerve, the electrode can be firmly fixed.) and configured to output the energy signal out of one of the communication bays (para [0028]: The metal wire 220 disposed in the first hole 211 is a bi-polar electrode, preferably. The shape of the metal wire 220 is not particularly restricted, but may be of a circle or an oval, so long as it can stimulate cranial nerves and can be disposed in the first hole.). It would have been obvious to one having ordinary skill in the art to combine the device of Creasey with the holes of Jung, such that the holes of Jung include the electrodes of Creasey instead of the electrodes of Jung (see Jung, para [0026]), in order to realize the advantages described by Jung to firmly fix the electrode for stimulating cranial nerves (see Jung, para [0026] and [0031]).

Claims 9-11, 14-21, 24-28, 53-62 and 64-70 lack an inventive step under PCT Article 33(3) as being obvious over Creasey in view of US 9,582,035 B2 to Connor (hereinafter Connor).

Regarding Claim 9, Creasey discloses the device of claim 1. Creasey further discloses the attachment element (adhesive conductive pads) configured to maintain the tissue interface against the skin (para [0053]: In one or more examples, a Smart Band Aid incorporating a battery and electronic circuit and electrodes in the form of adhesive conductive pads may be applied to the skin, and electrical stimuli is passed from the adhesive pads into the tissues.), but does not specifically disclose: the attachment element comprising an elastic portion. However, Connor discloses the attachment element (attachment member) comprising an elastic portion (col. 12 lns 9-12: In an example, centrally-flared attachment member 104 can be stretchable, elastic, or expandable. In an example, centrally-flared attachment member 104 can be made with a stretchable or elastic fabric or polymer.). It would have been obvious to one having ordinary skill in the art to combine Creasey with the elastic attatchment member of Connor, such that that the attachment member is made with a series of expandable and elastic links (see Connor, col. 12 lns 9-14), in order to realize the advantages described by Connor to be improve usability by expanding the attachment member to a sufficiently large circumference that it can be slipped over a persons hand and onto the persons wrist and/or arm (see Connor, col. 12 lns 15-18).

Regarding Claim 10, Creasey in view of Connor disclose the device of claim 9. Creasey further discloses, receive a circular portion of the skin (limb) and maintain the tissue interface against the circular portion of the skin (para [0078]: FIG. 19 shows a example of stimulating and sensing patterns of signals in a volume of tissue. Electrodes 1910 as part of a cuff arrangement are placed around limb 1915. The electrodes 1910 are external to a layer of skin 1916 on limb 1915), the elastic portion expands (col. 12 lns 15-18: In an example, centrally-flared attachment member 104 can be stretched or expanded to a sufficiently-large circumference that it can be slipped over a person's hand and onto the person's wrist and/or arm.) and contracts (as depicted in FIG. 29; col. 5 lns 58-59: FIG. 29 shows a wearable device with a display and a contracting attachment member.).

Regarding Claim 11, Creasey discloses the device of claim 1. Creasey does not specifically disclose: wherein the body is removably attached to the attachment element. However, Connor discloses removably attached modular electronic components (col. 88 lns 59-62: In an example, the attachment member can be a flexible structure with an array of rigid, but flexibly-connected, circular parts to which modular electronic components can be removably attached.). It would have been obvious to one having ordinary skill in the art to combine Creasey with the removable attachment arrangement of Connor, such that the body of Creasy is removably attached to the attachment element via one or more mechansisms (e.g., snaps, clasps, buckles) (see Connor, col. 11 lns 61-63), in order to realize the advantages to expand totally system display area by adding additional connectible modules (see Connor, col. 37 lns 55-60).

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Regarding Claim 14, Creasey discloses the device of claim 1. Creasey further discloses, wherein: the plurality of energy generators are spaced apart on the surface of the body in a pattern (as depicted in FIG. 18); each energy generator is operable to output the one or more energies in the signal direction (para [0052]: nerve stimulation via one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regiment; para [0059]: Each electrode may consist of a plurality of conductive contacts that give the electrode abilities to adjust the depth, directionality, and spatial distribution of the applied electric field.) toward a different point on the pattern (para [0077]: An example 10L~10 matrix of electrical contacts 1860 is shown. By varying the pattern of electrical contacts 1860 employed to cause an electric field 1820 to form and by time varying the applied electrical power to this pattern of contacts 1860, it is possible to steer the field 1820 across different parts of the body, which may include muscle 1870, bone, fat, and other tissue, in three dimensions.), but Creasey does not specifically disclose: the energy signal comprises a plurality of symbols based on the pattern. Connor discloses the energy signal comprises a plurality of symbols based on the pattern (col. 94 lns 23-29: In an example, the visual information displayed by the first display module and the visual information displayed by the second display module can be different parts, portions, or segments of the same picture, text content, application, and/or webpage. In an example the visual information displayed by the first and second display modules can be sequential, coordinated, and/or related.). It would have been obvious to one having ordinary skill in the art to combine Creasey with the multiple display members displaying symbols, such that the display member of Conner is a modular electronic that is removably attached to the body of a device that is wrapped around a personLfs wrist (see Connor, col. 88 lns 59-62), in order to realize the advantages described by Connor to provide an interactive, touch responsive screen worn on the dorsal surface of a person's wrist (see Connor, col. 11 lns 15-29).

Regarding Claim 15, Creasey in view of Connor disclose the device of claim 14. Connor further discloses, wherein each symbol comprises a plurality of dots (pixels), and each dot corresponds with one of the different points on the pattern (col. 55 lns 26-30: In an example, array of light-emitting members 4002 can comprise an arcuate array of Light Emitting Diodes (LEDs). In an example, array of light-emitting members 4002 can comprise an array of pixels in a single arcuate computer display screen).

Regarding Claim 16, Creasey in view of Connor disclose the device of claim 14. Connor further discloses, wherein the plurality of symbols comprises at least one alphanumeric symbol (col. 152 lns 9-15: In an example, the perimeters of the display members can be connected along a common proximal-to-distal longitudinal axis. In an example, the perimeters of two of the display members can combine to form a figure-eight symbol or an infinity symbol with a longitudinal orientation along the person's wrist and/or forearm; col. 127 lns 55-56: In an example, a human-to-computer interface can be a keypad, keyboard, or other set of buttons).

Regarding Claim 17, Creasey in view of Connor disclose the device of claim 14. Connor further discloses, wherein the processing unit is operable with the plurality of energy generators to scroll the plurality of symbols across the skin at a scroll rate in a communication direction transverse with the signal direction (as depicted in FIG. 40; col. 55 lns 19-25: In an example, the second segment is shifted one (or more) lateral lines of light-emitting members to the right of the first segment. In this manner, the device displays the message in a circumferentially-scrolling manner which can be read from multiple angles. In the example shown in FIG. 40, the circumferentially-scrolling message is "JIM CALLED").

Regarding Claim 18, Creasey in view of Connor disclose the device of claim 16. Connor further discloses, wherein the input data comprises vital signs of a subject, and the plurality of symbols comprises symbol associated with each vital sign (col. 63 lns 14-38: In various examples, this energy level with which a device communicates an incoming message can be based on information from one or more sensors selected from the group consisting of: accelerometer, biochemical sensor, blood oximetry sensor, blood pressure sensor, camera, chemiresistor, chemoreceptor sensor, chromatography sensor, compass, dual-axial accelerometer, electrocardiogram (ECG) sensor...temperature sensor, tri-axial accelerometer, ultrasonic sensor, and ultraviolet light sensor).

Regarding Claim 19, Creasey in view of Connor disclose the device of claim 18. Conner further discloses wherein the plurality of symbols comprises a symbol associated with a location of the subject (GPS sensor and gyroscope) (col. 63 lns 14-24: In various examples, this energy level with which a device communicates an incoming message can be based on information from one or more sensors selected from the group consisting of:...GPS sensor, gyroscope).

Regarding Claim 20, Creasey in view of Connor disclose the device of claim 19. Conner further discloses, wherein the processing unit is configured to: determine a change of the vital signs (col. 206 lns 60-66: FIG. 155 shows a forearm-wearable computing device comprising: (a) an attachment member 15501 which is configured to be worn on a person's forearm and/or wrist; (b) a spectroscopic sensor 15502 which collects data concerning the spectrum of light reflected from (or passing through) the person's tissue; (c) a data processing unit 15503 which analyzes data from the spectroscopic sensor); and modify one or both of the plurality of symbols and the scroll rate based on the change of the vital signs (col. 206 lns 67 to col. 207 lns 1-3: a computer-to-human visual display 15504, wherein the level of light energy emitted from the display is automatically adjusted based on the spectrum of light reflected from (or passing through) the person's tissue).

Regarding Claim 21, Creasey in view of Connor disclose the device of claim 20. Connor further discloses, wherein processing unit is configured to: output one or more of the plurality of symbols with a first combination of the one or more energies when the change is within a predetermined range (col. 71 lns 59-67: In an example, notification magnitude can depend on detection of a specific pattern and/or change in electromagnetic brain activity. In an example, a pattern and/or change in electromagnetic brain activity can be a one-time pattern. In another example, a pattern of electromagnetic brain activity can repeat over time in a rhythmic manner. In an example, a pattern of electromagnetic brain activity can comprise frequency of repetition, frequency band or range of repetition); and output the one or more of the plurality of symbols with a second combination of the one or more energies when the change is outside the predetermined range (col. 71 lns 49-58: The lower portion of FIG. 62 shows how the system responds when it receives an incoming message at a time when wearable electromagnetic brain activity monitor 6205 is detecting a second pattern of electromagnetic brain activity. In this second situation, the system provides notification of the incoming message at a higher energy level, magnitude, or intensity. In this example, this comprises a loud audio notification via speaker 6204. A system which changes its notification magnitude based on a person's electromagnetic brain activity can be useful).

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Regarding Claim 24, Creasey discloses the device of claim 23. Creasey does not specifically disclose: wherein the control signal comprises a scroll rate for the energy signal the processing unit is further configured to: select the scroll rate based on the input data; and cause the plurality of generators to scroll the one or more energies across the skin at the scroll rate. However, Connor discloses the control signal comprises a scroll rate (a scroll rate for EEG data; a scroll rate ECG data) for the energy signal (col. 63 lns 14-38: In various examples, this energy level with which a device communicates an incoming message can be based on information from one or more sensors selected from the group consisting of: accelerometer, biochemical sensor, blood oximetry sensor, blood pressure sensor, camera, chemiresistor, chemoreceptor sensor, chromatography sensor, compass, dual-axial accelerometer, electrocardiogram (ECG) sensor...temperature sensor, tri-axial accelerometer, ultrasonic sensor, and ultraviolet light sensor). It would have been obvious to one having ordinary skill in the art to combine the Creasey with the display of Connor, which is configured to display an incoming message based on information sensed from one or more sensors of Creasey (see Connors, col. 63 lns 14-38), in order to realize the advantages described by Connors to dynamically provide information to a display based on changes of sensed data (see Connors, col. 63 lns 14-38, col. 71 lns 49-58). Although Connor does not specifically disclose that the processing unit is further configured to: select the scroll rate based on the input data; and cause the plurality of generators to scroll the one or more energies across the skin at the scroll rate, it would have been obvious to one having ordinary skill in the art to recognize that Connor teaches scrolling information on a display based on various sensor inputs (see Connor, col. 63 lns 14-38). Furthermore, a scrolling rate will depend on the nature of the sensory input provided. For example, a scrolling rate representing a monitored ECG signal may differ from a scrolling rate representing a monitored EEG signal or a measured action potential. Accordingly, based on the input data sensed, a scrolling rate for that input data is implemented for the message (e.g., a cardiograph) displayed to the user, and will cause the LED elements of Connor (i.e., generators) to scroll this message across the skin at the scroll rate (as depicted in FIG. 40).

Regarding Claim 25, Creasey discloses the device of claim 22. Creasey further discloses, wherein: each energy generator (para [0052]: nerve stimulation via one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regiment); the control signal comprises output commands for each controller of each energy generator (para [0066]: Typically the TNSS may receive commands from the controller, generate stimuli and apply these to the tissues, sense signals from the tissues, and transmit these to the controller. It may also analyze the signals sensed and use this information to modify the stimulation applied.); and each controller is configured to receive the control signal (para [0066]: sense signals from the tissues, and transmit these to the controller), select one of the output commands (para [0066]: It may also analyze the signals sensed and use this information to modify the stimulation applied), but does not specifically disclose: each energy generator comprises a plurality of generator elements and a controller operable with the plurality of generator elements to output the plurality of energies; or cause one or more of the plurality of generator elements to output the one or more energies based on the selected one of the output commands. However, Connor discloses a plurality of generator elements (energy harvesting member) operable with the plurality of generator elements to output the plurality of energies (col. 83 lns 59-63: In various examples, an energy harvesting member can harvest, transduce, or generate electrical energy from kinetic energy, thermal energy, biochemical energy, ambient light energy, and/or ambient electromagnetic energy.) and cause one or more of the plurality of generator elements to output the one or more energies (col. 83 lns 55-59: In an example, data control unit 7304 can further comprise one or more components selected from the group consisting of: data processing member, data transmitting member, data receiving member, power source, and energy harvesting member). It would have been obvious to one having ordinary skill in the art to combine Creasey with the generator elements of Connor, such that a controller of Creasey is configured to cause one or more of the generator elements of Connor to output energies (see Connor, col. 83 lns 55-63), in order to realize the advantages for providing a means to automatically issue commands for energy generation in response to feedback received from a sensor. Although neither Creasey nor Connor specifically discloses based on the selected one of the output commands, Creasey does disclose a controller issuing commands to modify an energy stimuli based on sensed signals (see Creasey, para [0066]). It would have been obvious to one having ordinary skill in the art to recognize that the commands for modifying the stimulation energy can be performed by the generator elements of Connor, such that the nerve stimulation applied by a device described by Creasey in view of Connor is reflective of an output command to either decrease or increase the amount of nerve stimulation.

Regarding Claim 26, Creasey discloses the device of claim 1. Creasey does not specifically disclose: each energy generator comprises a plurality of generator elements, and each generator element is operable to output one of the plurality of energies in the signal direction. However, Connor discloses each energy generator comprises a plurality of generator elements (energy harvesting member), and each generator element is operable to output one of the plurality of energies (col. 83 lns 59-63: In various examples, an energy harvesting member can harvest, transduce, or generate electrical energy from kinetic energy, thermal energy, biochemical energy, ambient light energy, and/or ambient electromagnetic energy.) in the signal direction (col. 190 lns 35-39: a first and/or second pattern of light energy data can be a selected level, intensity, wavelength, direction, polarity, phase, and/or spectral distribution of light which is reflected from and/or transmitted through body tissue). It would have been obvious to one having ordinary skill in the art to combine Creasey with the generator elements of Connor, such that a controller of Creasey is configured to cause one or more of the generator elements of Connor to output energies (see Connor, col. 83 lns 55-63), in order to realize the advantages for providing a means to automatically issue commands for energy generation in response to feedback received from a sensor.

Regarding Claim 27, Creasey in view of Connor disclose the device of claim 26. Connor further discloses, wherein the plurality of generator elements comprise one or more of: an impact generator element; a heat generator element (thermal energy); a shock generator element; and a pressure generator element (col. 83 lns 59-63: In various examples, an energy harvesting member can harvest, transduce, or generate electrical energy from kinetic energy, thermal energy, biochemical energy, ambient light energy, and/or ambient electromagnetic energy).

Regarding Claim 28, Creasey in view of Connor disclose the device of claim 27. Connor further discloses, wherein each generator element is configured to output the one of the plurality of energies toward a similar point or area on the skin (direction and spectral distribution of light transmitted to the body) (col. 190 lns 35-39: a first and/or second pattern of light energy data can be a selected level, intensity, wavelength, direction, polarity, phase, and/or spectral distribution of light which is reflected from and/or transmitted through body tissue).

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Regarding Claim 53, Creasey discloses the device of claim 52. Creasey discloses the band (electrodes 404 of configuration 902, as depicted in FIG. 9), but does not specifically disclose: wherein the processing unit is operable with the plurality of energy generators to scroll each different energy signal in each band in a communication direction transverse with the signal direction. However, Connor discloses the processing unit is operable with the plurality of energy generators to scroll each different energy signal in each band in a communication direction transverse with the signal direction (as depicted in FIG. 40; col. 55 lns 19-25: In an example, the second segment is shifted one (or more) lateral lines of light-emitting members to the right of the first segment. In this manner, the device displays the message in a circumferentially-scrolling manner which can be read from multiple angles. In the example shown in FIG. 40, the circumferentially-scrolling message is LgJIM CALLEDLh.). It would have been obvious to one having ordinary skill in the art to combine Creasey with the multiple display members displaying symbols, such that the display member of Conner is a modular electronic that is removably attached to the body of a device that is wrapped around a personLfs wrist (see Connor, col. 88 lns 59-62), in order to realize the advantages described by Connor to improve usability by providing an interactive, touch responsive screen worn on the dorsal surface of a person's wrist (see Connor, col. 11 lns 15-29).

Regarding Claim 54, Creasey in view of Connor disclose the device of claim 53. Connor further discloses, wherein the input data for each band comprises different vital signs, and each different energy signal is based on one of the different vital signs (col. 63 lns 14-38: In various examples, this energy level with which a device communicates an incoming message can be based on information from one or more sensors selected from the group consisting of: accelerometer, biochemical sensor, blood oximetry sensor, blood pressure sensor, camera, chemiresistor, chemoreceptor sensor, chromatography sensor, compass, dual-axial accelerometer, electrocardiogram (ECG) sensor...temperature sensor, tri-axial accelerometer, ultrasonic sensor, and ultraviolet light sensor).

Regarding Claim 55, Creasey discloses the device of claim 1. Creasey further discloses, wherein the signal direction comprises a first signal direction (para [0059]: Each electrode may consist of a plurality of conductive contacts that give the electrode abilities to adjust the depth, directionality, and spatial distribution of the applied electric field), wherein the processing unit is operable with the tissue interface to communicate with nerves associated the skin outputting the energy signal with the one or more energies of the plurality of energies in the first signal direction (para [0052]: Referring to FIG. 4, the TNSS has one or more electronic circuits or chips that perform the functions of: communications with the controller, nerve stimulation via one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regimen), but does not specifically disclose: and the device comprises: an optical interface on a proximal surface of the body, the optical interface comprising at least one display element operable to output at least one color toward eyes in a second signal direction opposite of the first signal direction, and the optical interface simultaneously to the eyes by and outputting an optical signal with the at least one color in the second signal direction. However, Connor discloses, an optical interface on a proximal surface of the body (as depcited in FIG. 28), the optical interface comprising at least one display element operable to output (col. 55 lns 26-30: In an example, array of light-emitting members 4002 can comprise an arcuate array of Light Emitting Diodes (LEDs). In an example, array of light-emitting members 4002 can comprise an array of pixels in a single arcuate computer display screen.) at least one color (col. 28 lns 13-26: different parameters of light emission can be selected from...color and/or spectral frequency) toward eyes in a second signal direction (towards the userLfs field of view) (col. 46 lns 64-66: In an example, when the person moves their wrist and/or forearm to look at the device) opposite of the first signal direction, wherein the processing unit is operable with the optical interface to communicate simultaneously with nerves associated the skin (col. 83 lns 59-63: In various examples, an energy harvesting member can harvest, transduce, or generate electrical energy from kinetic energy, thermal energy, biochemical energy, ambient light energy, and/or ambient electromagnetic energy.) and the eyes by outputting the energy signal with the one or more energies of the plurality of energies in the first signal direction and outputting an optical signal with the at least one color in the second signal direction (col. 12 lns 51-61: In various examples, this device can further comprise: one or more LEDs, lasers, or other light-emitting members...one or more neurostimulators...In an example, one or more sensors can be co-located with display member). It would have been obvious to one having ordinary skill in the art to combine Creasey with the multiple display members displaying symbols, such that the display member of Conner is a modular electronic that is removably attached to the body of a device that is wrapped around a personLfs wrist (see Connor, col. 88 lns 59-62), in order to realize the advantages described by Connor to improve usability by providing an interactive, touch responsive screen worn on the dorsal surface of a person's wrist (see Connor, col. 11 lns 15-29).

Regarding Claim 56, Creasey in view of Connor disclose the device of claim 55. Creasey further discloses, wherein the body extends along a longitudinal axis (configuration 902, as depicted in FIG. 9); and the bands are spaced apart along the longitudinal axis (electrodes 404 of configuration 902, as depicted in FIG. 9).

Regarding Claim 57, Creasey in view of Conner disclose the device of claim 56. Conner further discloses wherein the optical signal are scrolled along or about the longitudinal axis (as depicted in FIG. 40; col. 55 lns 19-25: In an example, the second segment is shifted one (or more) lateral lines of light-emitting members to the right of the first segment. In this manner, the device displays the message in a circumferentially-scrolling manner which can be read from multiple angles. In the example shown in FIG. 40, the circumferentially-scrolling message is "JIM CALLED"), but does not specifically disclose together with the energy signal. Although neither Creasey nor Conner specifically disclose scrolling the energy signal together with the optical signal, Conner does disclose that the display member which emits the optical signal in a scrolling fashion also comprises an electrical component, such as a neurostimulators (col. 12 lns 51-61: In various examples, this device can further comprise: one or more LEDs, lasers, or other light-emitting members...one or more neurostimulators...In an example, one or more sensors can be co-located with display member). It would have been obvious to one having ordinary skill in the art, without undue experimentation and optimization, for the control unit of Conner to simultaneously send a command to each of an array of neurostimulators, such that the neurostimulators are actuated in a scrolling fashion similar to that of the optical output. Furthermore Creasey discloses specifically activating certain nerves (para [0077]: This electric field 1820 can activate specific nerves or nerve bundles 1880 while sensing the electrical and mechanical actions produced 1890, and thereby enabling the TNSS to discover more effective or the most effective pattern of stimulation for producing the desired action.). Accordingly, it would have been obvious to one having ordinary skill in the art to recognize that activating specific nerves in a scrolling fashion can be accomplished based on a user-programmed treatment regimen of Creasey.

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Regarding Claim 58, Creasey in view of Conner disclose the device of claim 55. Creasey further discloses, wherein the processing unit is configured to (para [0032]: It consists of one or more controllers or Control Units, one or more TNSS modules, software that resides in Control Units and TNSS modules, wireless communication between these components, and a data managing platform. The controller hosts software that will control the functions of the TNSS.): receive the input data from the data source (para [0066]: TNSS protocol performs the functions of communications with the controller including transmitting and receiving of control and data signals, activation and control of the neural stimulation, data gathering from on board sensors, communications and coordination with other TNSSs, and data analysis; para [0032]: It consists of one or more controllers or Control Units, one or more TNSS modules, software that resides in Control Units and TNSS modules, wireless communication between these components, and a data managing platform); generate a control signal based on the input data; cause the plurality of energy generators to output the energy signal according to the control signal (para [0066]: Typically the TNSS may receive commands from the controller, generate stimuli and apply these to the tissues), but does not specifically disclose: cause the at least one display element to simultaneously output the optical signal according to the control signal. However, Conner discloses cause the at least one display element to simultaneously output the optical signal according to the control signal (as depicted in FIG. 40; col. 55 lns 19-25: In an example, the second segment is shifted one (or more) lateral lines of light-emitting members to the right of the first segment. In this manner, the device displays the message in a circumferentially-scrolling manner which can be read from multiple angles. In the example shown in FIG. 40, the circumferentially-scrolling message is "JIM CALLED"; col. 28 lns 13-26: different parameters of light emission can be selected from...color and/or spectral frequency).

Regarding Claim 59, Creasey in view of Connor disclose the device of claim 58. Connor further discloses, wherein the energy signal corresponds with the optical signal (col. 116 lns 62-66: In this example, display modules (including 7403, 7404, 7405, 7406, 7407, and 7408) are selected from the group consisting of: computer screen, computer display, touch screen, light-emitting member, infrared light emitter, laser, light emitting diode (LED), light-emitting optical fiber).

Regarding Claim 60, Creasey in view of Connor disclose the device of claim 59. Connor further discloses, wherein the input data comprises vital signs of a subject (col. 63 lns 14-38: In various examples, this energy level with which a device communicates an incoming message can be based on information from one or more sensors selected from the group consisting of: accelerometer, biochemical sensor, blood oximetry sensor, blood pressure sensor, camera, chemiresistor, chemoreceptor sensor, chromatography sensor, compass, dual-axial accelerometer, electrocardiogram (ECG) sensor...temperature sensor, tri-axial accelerometer, ultrasonic sensor, and ultraviolet light sensor.), the energy signal comprises a plurality of symbols associated with the vital signs, and the optical signal comprises the plurality of symbols ((col. 94 lns 23-29: In an example, the visual information displayed by the first display module and the visual information displayed by the second display module can be different parts, portions, or segments of the same picture, text content, application, and/or webpage).

Regarding Claim 61, Creasey in view of Connor disclose the device of claim 60. Connor further discloses, wherein the processing unit is configured to: determine a change of the vital signs (col. 206 lns 60-66: FIG. 155 shows a forearm-wearable computing device comprising: (a) an attachment member 15501 which is configured to be worn on a person's forearm and/or wrist; (b) a spectroscopic sensor 15502 which collects data concerning the spectrum of light reflected from (or passing through) the person's tissue; (c) a data processing unit 15503 which analyzes data from the spectroscopic sensor); and modify the plurality of symbols based on the change of the vital signs (col. 206 lns 67 to col. 207 lns 1-3: a computer-to-human visual display 15504, wherein the level of light energy emitted from the display is automatically adjusted based on the spectrum of light reflected from (or passing through) the person's tissue).

Regarding Claim 62, Creasey in view of Connor disclose the device of claim 61. Connor further discloses, comprising a motion sensor attached to the body (accelerometer/gyroscope), wherein the processing unit is configured to selectively output the optical signal in response to the motion sensor (col. 46 lns 64-67 to col. 47 lns 1-5: In an example, when the person moves their wrist and/or forearm to look at the device, the variable-brightness display member 3002 transitions from a lower (power saving) first brightness level to a higher (easier-to-see) second brightness level. This can help to provide a bright display when needed, but conserve power when not needed. In an example, sensor 3003 can be selected from the group consisting of: accelerometer; inclinometer, and gyroscope).

Regarding Claim 64, Creasey in view of Connor disclose the system of claim 62. Creasey further discloses, further comprising at least one position sensor configured to determine the position data (para [0107]: Sensing the position and orientation of arms, legs and the rest of the body produces a picture of an onscreen player that can interact with other players anywhere on the Internet. Tactile feedback would be provided to players by actuators in Smart Band Aids on various parts of the body to give the sensation of striking a ball, etc.) and output the position data to the at least one processor (para [0088]: Recording of mechanical activity of the body: Sensors in a Smart Band AidTM record position, location and orientation of a person or of body parts and transmit this data to a smartphone for the user and/or to other computer networks for safety monitoring, analysis of function and coordination of stimulation).

Regarding Claim 65, Creasey in view of Connor disclose the system of claim 64. Creasey further discloses, wherein: the position data comprises an actual location of each communication device (electrodes) (para [0078]: Electrodes 1910 may act as an array of electrodes sensing voltages at different times and locations on the surface of the body, with software processing this information to display information about the activity in body tissues, e.g. which muscles are activated by different patterns of stimulation; para [0106]: Sensing the position and orientation of multiple limb segments is used to provide visual feedback on a smart phone of for example, a golf swing, and also mechanical or electrical feedback to the user at particular times during the swing to show them how to change their actions. The electromyogram of muscles could also be recorded from one or many Smart Band Aids TM and used for more detailed analysis); and the at least one processor is configured to generate the corrective motion signal (para [0035]: The process may also start with sensing, and when an event in the body is detected this information is used to specify stimulation to treat or correct the event) based on the actual location of each communication device and a target location of each communication device (para [0103]: People whose trunk muscles are paralyzed may have difficulty maintaining their posture even in a wheelchair. They may fall forward unless they wear a seatbelt, and if they lean forward they may be unable to regain upright posture. Electrical stimulation of the muscles of the lower back using a Smart Band Aid TM allows them to maintain and regain upright posture. Sensors in the Smart Band Aid TM trigger this stimulation when a change in posture was detected).

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Regarding Claim 66, Creasey in view of Connor disclose the system of claim 64. Creasey further discloses, wherein: the position data comprises an actual spatial configuration of the plurality of communication devices (electrodes) (para [0078]: Electrodes 1910 may act as an array of electrodes sensing voltages at different times and locations on the surface of the body, with software processing this information to display information about the activity in body tissues, e.g. which muscles are activated by different patterns of stimulation; para [0106]: Sensing the position and orientation of multiple limb segments is used to provide visual feedback on a smart phone of for example, a golf swing, and also mechanical or electrical feedback to the user at particular times during the swing to show them how to change their actions. The electromyogram of muscles could also be recorded from one or many Smart Band Aids TM and used for more detailed analysis); and the at least one processor is configured to generate the corrective motion signal (para [0035]: The process may also start with sensing, and when an event in the body is detected this information is used to specify stimulation to treat or correct the event) based on the actual spatial configuration and a target spatial arrangement for the plurality of communication devices (para [0103]: People whose trunk muscles are paralyzed may have difficulty maintaining their posture even in a wheelchair. They may fall forward unless they wear a seat belt, and if they lean forward they may be unable to regain upright posture. Electrical stimulation of the muscles of the lower back using a Smart Band Aid TM allows them to maintain and regain upright posture. Sensors in the Smart Band Aid TM trigger this stimulation when a change in posture was detected).

Regarding Claim 67, Creasey in view of Connor disclose the system of claim 66. Creasey further discloses, wherein the at least one processor is configured to: determine a movement direction for each communication device based on the actual and target spatial arrangements (para [0106]: Sensing the position and orientation of multiple limb segments is used to provide visual feedback on a smart phone of for example, a golf swing, and also mechanical or electrical feedback to the user at particular times during the swing to show them how to change their actions; para [0035]); and cause each communication device to scroll its energy signal across the skin in the movement direction (para [0077]: This electric field 1820 can activate specific nerves or nerve bundles 1880 while sensing the electrical and mechanical actions produced 1890, and thereby enabling the TNSS to discover more effective or the most effective pattern of stimulation for producing the desired action.). It would have been obvious to one having ordinary skill in the art to recognize that activating specific nerves in a scrolling fashion can be accomplished based on a user-programmed treatment regimen of Creasey, in order to realize the advantages described by Creasey for producing the most effective pattern of stimulation for producing the desired action (see Creasey, para [0077]).

Regarding Claim 68, Creasey in view of Connor disclose the system of claim 67. Creasey further discloses, wherein: each communication device is mounted to a different part of a user body (as depicted in FIG. 16); and the target spatial arrangement (the users desires (e.g., a desired position) as expressed when the user touches the smartphone) comprises a physical position of the user body defined by relative positions of each different part of the user body (para [0043]: Analyzing TNSS data, as well as other feedback data such as from the user, within the TNSS, and/or the controller and/or the cloud. The protocol analyzes data sensed by the TNSS, such as the position of a muscle, and data from the user such as the user's desires as expressed when the user touches an icon on the Smartphone; this analysis can be done in the TNSS, in the smartphone, and/or in the cloud.).

Regarding Claim 69, Creasey in view of Connor disclose the system of claim 68. Creasey further discloses, wherein physical position of the user body comprises a pose or a stance (standing) (para [0099]: Standing: People with spinal cord injury or some other paralyses can be aided to standby electrical stimulation of the quadriceps muscles of their thigh. These muscles are stimulated by Smart Band Aids TM applied to the front of the thigh and triggered by sensors or buttons operated by the patient using an application on a Smartphone. This may also assist patients to use lower limb muscles when transferring from a bed to a chair or other surface; para [0106]).

Regarding Claim 70, Creasey in view of Connor disclose the system of claim 69. Creasey further discloses, wherein the at least one processor is configured to guide the user body through a series of different positions by determining the movement direction at intervals and modifying the energy signal for each interval (para [0106]: Sensing the position and orientation of multiple limb segments is used to provide visual feedback on a smart phone of for example, a golf swing, and also mechanical or electrical feedback to the user at particular times during the Swing to show them how to change their actions. The electromyogram of muscles could also be recorded from one or many Smart Band Aids TM and used for more detailed analysis).

Claim 36 lacks an inventive step under PCT Article 33(3) as being obvious over Creasey in view of US 5,627,548 A to Woo et al. (hereinafter Woo).

Regarding Claim 36, Creasey discloses the device of claim 35. Creasey further discloses the power generator mounted to a proximal surface of the body (para [0051], [0054]: Referring to FIG. 5, limited lifetime battery sources will be employed as internal power supply 412, to power the TNSS deployed in this illustration as a Smart Band Aid.. These may take the form of Lithium Ion technology or traditional non-toxic MnO2 technologies.), but not specifically a photovoltaic cell. However, Woo discloses a photovoltaic cell (col. 1 lns 49-50: Photovoltaic solar cells to each side of the LCD help keep a battery charged; col. 2 lns 39-44: FIGS. 1 and 2 illustrate a global positioning system (GPS) receiver system embodiment of the present invention, referred to herein by the general reference numeral 10. GPS receiver system 10 comprises a shoulder-worn unit 12 with an optional photo-voltaic (PV) solar cell 14, and a wrist worn unit 16.). It would have been obvious to one having ordinary skill in the art to combine Creasey with the photovoltaic cell of Woo, such that the cell is configured to power the patch of Creasey (see Woo, FIG. 1), in order to realize the advantages of using a solar cell which can improve portability in sunlight enriched environments by keeping the battery charged.

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Claim 48 and 49 lack an inventive step under PCT Article 33(3) as being obvious over Creasey in view of US 2013/0202674 A1 (Ericson).

Regarding Claim 48, Creasey discloses the device of claim 47. Creasey does not specifically disclose: wherein the attachment element comprises a bone plate engageable with a bone to orient the tissue interface toward an underside of the skin. However, Ericson discloses, wherein the attachment element comprises a bone plate engageable with a bone to orient the tissue interface toward an underside of the skin (para [0096]: For example, patches with primer applied on both sides can be used to join two surfaces of skin, a pleural space, spaces between bone tissue surfaces, and other such cavities within a body; para [0104]: The tissue patches can be configured to be applied to any type of tissue including soft tissue, bone tissue, or any other type of tissue; para [0157]: This example describes experiments in which a tissue patch was used to seal bone tissue. A lateral approach to the porcine stifle joint was created.). It would have been obvious to one having ordinary skill in the art to combine Creasey with the bone plate engaging attachment element of Ericson, such that the attachment element of Creasey incorporates the adhesive primer of Ericson (Ericson, para [0079]), in order to realize the advantages described by Ericon to use the patch to assist with wound healing (see Ericson, para [0092]).

Regarding Claim 49, Creasey in view of Ericson disclose the device of claim 48. Ericson further discloses, wherein the attachment element comprises a tissue in-growth structure interactable with living tissue to maintain an orientation of the tissue interface toward an underside of the skin (para [0092]: one or more growth factors can be included in and/or on a surface of the tissue patches described herein. Such growth factors can contribute to hemostasis, tissue healing, or other biological processes; para [0096]: For example, patches with primer applied on both sides can be used to join two surfaces of skin, a pleural space, spaces between bone tissue surfaces, and other such cavities within a body.).

Claims 4-7 lack an inventive step under PCT Article 33(3) as being obvious over Creasey, in view of Jung and further in view of US 2014/0172062 A1 (Yoon).

Regarding Claim 4, Creasey in view of Jung disclose the device of claim 3. Neither Creasey nor Jung specifically disclose: wherein the body comprising an insulating material configured to promote flows of the one or more energies out of the plurality of communication bays in directions in the signal direction, and limit flows of the one or more energies between the plurality of communication bays. However, Yoon discloses, wherein the body comprising an insulating material (para [0018]: The pad may include a pad body made of an insulating material, a through hole which extends through the pad body, and an electrode which is combined with the pad body in order to transfer the electrical stimulation generated by the main body of the electrical stimulator to the living body). It would have been obvious to one having ordinary skill in the art to combine Creasey with the insulating material of Yoon, such that an electrode of Creasey is incorporated with the pad insulating body of Yoon (see Yoon, para [0018]), in order to realize the advantages of incorporating insulating material to prevent unwanted transmission of energy signals from insulated portions of the device, and thereby improve selectivity of energy signal transmission. Although Yoon does not specifically disclose the insulating material configured to promote flows of the one one or more energies out of the plurality of communication bays in directions in the signal direction, and limit flows of the one or more energies between the plurality of communication bays, it would have been obvious to one having ordinary skill in the art to recognize, based on the inherent nature of an insulation material, that any portion of a device body that is insulated will limit flow of the one or more energies. Furthermore, communication bays are openings (e.g., holes) that do not contain any insulated material (see Yoon, para [0018]). Accordingly, it would have been obvious to one having ordinary skill in the art to recognize that these portions (i.e., communication bays) that are not part of the insulated body, and will be configured to promote flows of the one or more energies out of the communication bays in a signal direction, as previously described by Creasey (see Creasey, para [0077]).

Regarding Claim 5, Creasey in view of Jung and further in view of Yoon disclose the device of claim 4. Creasey discloses the attachment element (adhesive conductive pads) (para [0053]: In one or more examples, a Smart Band Aid incorporating a battery and electronic circuit and electrodes in the form of adhesive conductive pads may be applied to the skin, and electrical stimuli is passed from the adhesive pads into the tissues.) and the energy generator (para [0052]: one or more electrodes 408 that produce a wide range of electric field(s) according to treatment regimen), but not specifically: wherein the attachment element comprises a plurality of holes aligned with the plurality of communication bays, and each energy generator is configured to output the plurality of energies through one of the holes. Jung discloses, the plurality of communication bays (holes) (para [0026]: The glass fiber 210 has first and second holes 211 and 212), but does not specifically disclose: wherein the attachment element comprises a plurality of holes aligned with the plurality of communication bays, and each energy generator is configured to output the plurality of energies through one of the holes. Yoon discloses, a hole (para [0018]: The pad may include a pad body made of an insulating material, a through hole which extends through the pad body). It would have been obvious to one having ordinary skill in the art, without undue experimentation and optimization, for Yoon to include more than one hole as part of the main body of Yoon, such that each of the more than one holes can be used with a transparent film to monitor operational use of the medical device (see Yoon, para [0067]). Although none of Creasey, Jung or Yoon specifically disclose that a plurality of holes aligned with the plurality of communication bays, and each energy generator is configured to output the plurality of energies through one of the holes, it would have been obvious to one having ordinary skill in the art to recognize that a communication bay incorperated in Creasey will be aligned with the hole of Yoon to provide an unobstructed energy delivery path. Accordingly, if the energy generator (e.g., a nerve-stimulating electrode) has a direct path to emit energy from a source through a communication bay and an aligned hole, then it would have been obvious to one having ordinary skill in the art to recognize that each energy generator is configured to output the plurality of energies through the holes.

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Regarding Claim 6, Creasey in view of Jung and further in view of Yoon disclose the device of claim 5. Creasey further discloses, direct one or more energies in the signal direction (para [0062]: Because the radiated signals are out of phase they produce an interference pattern 1105 that results in the beam being formed and steered in varying controlled directions 1106.), but does not specifically disclose: wherein an interior surface of each communication bay is configured to direct the one or more energies in the signal direction. Jung further discloses, wherein an interior surface of each communication bay (interior portion of hole 211). It would have been obvious to one having ordinary skill in the art to recognize that the an interior surface of hole 211 of Jung which firmly fixes the nerve-stimulating electrode (see Jung, para [0026]), would be configured to integrate an electrode of Creasey, capable of producing an energy signal in varying controlled directions (see Creasey, para [0062]). Accordingly, the interior surface of hole 211 of Jung is configured to direct one or more energies in the signal direction, produced by an electrode of Creasey.

Regarding Claim 7, Creasey in view of Jung and further in view of Yoon disclose the device of claim 6. Creasey further discloses, focus one or more energies (para [0076]: The electrodes can therefore be designed to shape or steer or focus the electric field on some nerves more than on others, thereby providing more selective stimulation.), but does not specifically disclose: wherein an interior surface of each communication bay is configured to focus the one or more energies. Jung further discloses, wherein an interior surface of each communication bay (interior portion of hole 211). It would have been obvious to one having ordinary skill in the art to recognize that the an interior surface of hole 211 of Jung which firmly fixes the nerve-stimulating electrode (see Jung, para [0026]), would be configured to integrate an electrode of Creasey, capable of producing a focused energy signal (see Creasey, para [0076]). Accordingly, the interior surface of hole 211 of Jung is configured to focus one or more energies, produced by electrode of Creasey.

Claim 29 lacks an inventive step under PCT Article 33(3) as being obvious over Creasey, in view of Connor and further in view of Jung.

Regarding 29, Creasey in view of Connor disclose the device of claim 28. Neither Creasey nor Connor specifically disclose, wherein the plurality of generator elements are arranged coaxially with a communication axis parallel to the signal direction. However, Jung discloses plurality of generator elements (para [0028]: the metal wire 220 disposed in the first hole 211 is a bi-polar electrode; para [0027]: the glass fiber 210 may further include one or more holes having a metal wire or supplying a nervous-system drug.) are arranged with a communication axis parallel to the signal direction (para [0028]: It is advantageous for an electrode to be applied to fine cranial nerves, if the diameter satisfies the above-mentioned range. Further, it is also advantageous in implementing the integration and miniaturization of an electrode, which are essential elements for an embedded electrode for stimulating cranial nerves.). It would have been obvious to one having ordinary skill in the art to recognize that the addition of more holes having a metal wire in a similar fashion as hole 211 and wire 220 of FIG. 2 of Jung, would be arranged coaxially. Furthermore, it would have been obvious to one having ordinary skill in the art to combine Creasey with the coaxial arrangment of electrodes as obviated by Jung, such that a substrate of FIG. 3 can be provided for stimulating nerves (see Jung, FIG. 3; paras [0031]-[0032]), in order to realize the advantages described by Jung for providing essential elements for an embedded electrodes for stimulating cranial nerves (see Jung, para [0026]).

Claims 39-46 meet the criteria set forth under PCT Article 33(2)-(3) because the prior art fails to disclose or suggest the particular combination of elements recited in the claims.

The prior art is exemplified by Creasey and Connor.

Regarding Claim 39, Creasey discloses the device of claim 1. Creasey does not disclose: wherein: the body comprises an impact absorbing material; and the attachment element comprises a garment configured to maintain a position of the impact absorbing material relative to a user body.

Connor discloses the attachment element comprises a garment (as depicted in FIG. 89).
Conner does not disclose disclose the body comprises an impact absorbing material and the garment configured to maintain a position of the impact absorbing material relative to a user body. Accordingly, none of the prior art discloses the body comprises an impact absorbing material and the garment configured to maintain a position of the impact absorbing material relative to a user body. Further, the prior art, whether taken alone or in combination, fails to disclose or suggest the particular arrangement of these parts as required by the claim.

Claims 40 and 41 depend from claim 39 and meet the criteria set forth under PCT Article 33(2)-(3) for substantially the same reason.

Regarding Claim 42, Creasey discloses the device of claim 1. Neither Creasey nor Connor specifically disclose, wherein the attachment element comprises a shoe, and the distal surface of the body comprises an interior surface of the shoe. Accordingly, none of the prior art discloses wherein the attachment element comprises a shoe, and the distal surface of the body comprises an interior surface of the shoe. Further, the prior art, whether taken alone or in combination, fails to disclose or suggest the particular arrangement of these parts as required by the claim.

Claim 43 meets the criteria set out in PCT Article 33(2)-(3) as depending from claim 42.

Regarding Claim 44, Creasey discloses the device of claim 1. Creasey further discloses wherein the attachment element comprises a grip (para [0107]: Tactile feedback would be provided to players by actuators in Smart Band Aids on various parts of the body to give the sensation of striking a ball, etc.). Creasey does not disclose the body comprises an exterior surface of the grip. Accordingly, none of the prior art disclosesthe body comprises an exterior surface of the grip. Further, the prior art, whether taken alone or in combination, fails to disclose or suggest the particular arrangement of these parts as required by the claim.

Claims 45 and 46 meet the criteria set out in PCT Article 33(2)-(3) as depending from claim 44.

Claims 1-30 and 32-70 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

SEARCH HISTORY

Application Number	PCT/US 18/56814
Search Conducted By	AJ
Search Approved By	ALK

CPC/IPC Classifications Searched	CPC - A61B 5/0002, A61B 5/0015, A61B 5/04001, A61N 1/0456, A61N 1/0492, A61N 1/36014, A61N 1/36017, G06F 3/011, G06F 3/015, G06F 3/016 IPC(8) - A61N 1/04, A61B 5/04 (2019.01)
Date Conducted	12 February 2019 (12.02.2019)

Documentation Searched	CPC - A61B 5/0002, A61B 5/0015, A61B 5/04001, A61N 1/0456, A61N 1/0492, A61N 1/36014, A61N 1/36017, G06F 3/011, G06F 3/015, G06F 3/016 IPC(8) - A61N 1/04, A61B 5/04 (2019.01) (keyword delimited)
Search Terms Used	communicate communication input body housing enclosure skin wear worn patch band tissue generator source emitte attach attachment strap adhesive process processor cpu microprocessor controller microcontroller nerve nervous hole bay port bore communication elastic contract expand garment shoe covering grip grasp signal output light LED LCD pixel symbol interface
Date Conducted	12 February 2019 (12.02.2019)

Electronic Database Searched	PatBase
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW
Date Conducted	12 February 2019 (12.02.2019)
Search Logic:	
Search 1:	FT=(communicate~ OR communication OR input~) (Results 1000000)
Search 2:	1 AND FT=(body OR housing OR enclosure) (Results 1000000)
Search 3:	2 AND FT=(Skin OR wear~ OR worn OR patch) (Results 526298)

SEARCH HISTORY

Search 4: 3 AND FT=(nerve% OR nervous OR tissue) (Results 103575)
Search 5: 4 AND FT=(generator% OR source% OR emiter%) (Results 78864)
Search 6: 5 AND FT=(bay NEAR generator) (Results 1)
Search 6: 5 AND FT=(bay* NEAR (generator OR energy OR emit*)) (Results 60)
Search 7: PN=(US20160129248 OR US9582035) (Results 2)
Search 8: CTF 7 OR CTB 7 (Results 2798)
Search 9: 8 AND FT=(solar OR photovoltaic) (Results 179)
Search 10: PN=(US20160129248 OR US9582035B2) (Results 1)
Search 11: CTF 10 OR CTB 10 (Results 921)
Search 12: 11 AND FT=(solar OR photovoltaic) (Results 42)
Search 13: CPC = (A61B5/0002 OR A61B5/0015 OR A61B5/04001 OR A61N1/0456 OR A61N1/0492 OR A61N1/36014 OR A61N1/36017 OR G06F3/011 OR G06F3/015 OR G06F3/016) (Results 32019)
Search 14: IPC = (A61N1/04 OR A61B5/04) (Results 26617)
Search 15: 13 OR 14 (Results 54711)
Search 16: 15 AND FT=((impact OR protect*) NEAR material) (Results 783)
Search 17: 15 AND FT=(garment OR shoe) (Results 2073)
Search 18: 17 AND 11 (Results 71)
Search 19: 15 AND FT=((grip OR grasp OR hold) NEAR energy) (Results 33)
Search 20: FT=((nerve% OR nervous OR tissue) NEAR (stimulat* OR communicat* OR actuat* OR activat* OR transmit* OR monitor* OR sens*)) (Results 124208)
Search 21: 20 AND FT=(attach* OR patch* OR band OR worn OR wear OR garment OR covering OR grip OR grasp OR shoe) (Results 95613)
Search 22: 20 AND 15 (Results 7275)
Search 23: 22 AND FT=(Process~ OR processor% OR cpu OR microprocessor% OR controller OR microcontroller) (Results 6285)
Search 24: 23 AND FT=(energy NEAR (signal OR output OR light OR LED OR LCD OR pixel OR symbol OR interface)) (Results 1067)

Electronic Database Searched	Google
Files Searched	Google Patents
Date Conducted	12 February 2019 (12.02.2019)

Search Logic:

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) – 1,410,000 Results
(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) – 891,000 Results
(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) – 243,000 Results
(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocessor OR controller OR microcontroller) AND (nerve OR nervous) – 92,800 Results

energy (bay or port or hole) nerve stimulation – 2,620 Results

SEARCH HISTORY

elastic attachment nerve stimulation energy – 72,100 Results
coaxially communication signal energy generator tissue – 4,080 Results
coaxially communication signal energy generator skin surface – 6,450 Results

Electronic Database Searched	FreePatentsOnline
Files Searched	USPat, USPgPub, EPO, JPO, WIPO, Non-patent literature; word stemming on
Date Conducted	12 February 2019 (12.02.2019)

Search Logic:

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) – 475,986 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocessor OR controller OR microcontroller) AND (nerve OR nervous) – 177,405 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocessor OR controller OR microcontroller) AND (nerve OR nervous) AND (("bay energy"~5) OR ("hole energy"~5) OR ("port energy"~5)) – 572 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocessor OR controller OR microcontroller) AND (nerve OR nervous) AND (elastic) – 32,190 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocessor OR controller OR microcontroller) AND ("elastic attachment"~5) – 880 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocessor OR controller OR microcontroller) AND ("elastic adhesive"~5) – 2496 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocessor OR controller OR microcontroller) AND ("alphanumeric") AND (nerve OR nervous) – 2,496 Results

Electronic Database Searched	Google
Files Searched	Scholar

SEARCH HISTORY

Date Conducted	12 February 2019 (12.02.2019)

Search Logic:

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) – 4,100,000 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) – 1,110,000 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) – 235,000 Results

(communicate OR communication OR input) AND (body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) AND (attach~ OR attachment OR strap OR adhesive) AND (process OR processor OR cpu OR microprocesor) – 195,000 Results

(body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) coaxially – 25,400 Results

(body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) elastic bone plating – 23,300 Results

(body OR housing OR enclosure) AND (skin OR wear OR worn OR patch) AND (tissue) AND (generator OR source OR emitter) elastic bone position correction – 31,200 Results

Supplemental SAO searching:

Electronic Database Searched	PatBase
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW
Date Conducted	14 February 2019 (14.02.2019)
Search Logic:	

Search 1: (communicat* or transmit* or receiv* or interface~ or stimulat* or record~) near (nerve% or nervous) (Results 33765)
Search 2: 1 and (patch or worn or wearing or skin) (Results 19015)
Search 3: 2 and (patch or worn or wearing or affix~ or adhesiv* or glue~) near (skin or patient or user or person or arm or leg or chest or head or hand or foot) (Results 4700)
Search 4: 3 and (electrode% or generator% or contact%) near (array or grid or row% or column%) (Results 1364)
Search 5: 4 and (energies or volt% or voltage%) near (control~ or alter~ or vary~ or variable or plural* or multipl*) (Results 351)
Search 6: 5 and (processor% or microprocessor% or controller% or microcontroller% or cpu or computer) (Results 340)

SEARCH HISTORY

Search 7: 6 and (rubber or elastomer or elastomeric* or ((impact) near (absorb*))) (Results 169)
Search 8: 6 and (shoe% or boot or footwear) (Results 29)
Search 9: 6 and (grip) (Results 30)

1. > KR100746214B1 SKIN MASSAGER FOR MELASMA TREATMENT

Global Dossier

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SKIN MASSAGER FOR MELASMA TREATMENT

Abstract

A skin massage machine is provided to control and maintain a temperature of a head portion in a lower temperature state through a temperature maintaining unit for treating and decreasing user's freckle. A skin massage machine includes a body(100) having a grip and an on/off switch(102) formed on a lower portion thereof, a head portion(110) made of thermal conductive materials and formed on an upper portion of the body to come into contact with user's skin, a temperature sensor(111) for sensing a temperature of the head portion, a main controller controlling and maintaining the temperature of the head portion in the range of -20 to 10 deg.C on the basis of a signal of the temperature of the temperature sensor, a temperature maintaining unit controlling the temperature of the head portion in the range of -20 to 10 deg.C by a control signal output from the main controller, and an electric power supply portion(140) supplying an electric power to component parts.

Petitioner Therabody Ex-1004, 0539

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(54) 기미 치료용 피부 마사지기

(57) 요약

본 발명은 기미 치료용 피부 마사지기에 관한 것으로서, 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 제어 및 유지되는 헤드부를 구비하여 사용자가 저온 유지되는 상기 헤드부를 피부에 접촉시켜 일정시간 마사지하는 경우 기미 축소 및 치료의 효과를 거둘 수 있게 구성됨으로써, 저렴한 비용으로 가정에서 누구나 손쉽게 이용할 수가 있고, 또한 어떠한 부작용 발생 없이 장기간 지속적으로 이용할 수 있도록 한 기미 전문 치료용 피부 마사지기에 관한 것이다.

대표도

도 1

특허청구의 범위

청구항 1.

Petitioner Therabody Ex-1004, 0540

하측으로 손잡이부가 형성되고 온/오프 스위치를 포함한 구성요소들이 설치되는 마사지기 본체와;

사용자가 상기 마사지기 본체의 손잡이부를 잡고 피부에 접촉시켜 마사지를 할 수 있도록 상기 마사지기 본체 상단부에 설치되는 열전도 재질의 헤드부와;

상기 헤드부의 온도를 검출하기 위하여 설치되는 온도센서와;

상기 온도센서의 신호를 입력받아 이를 기초로 상기 헤드부의 온도를 -20 ~ 10℃의 온도범위로 제어 및 유지하기 위한 제어신호를 출력하는 메인 컨트롤러와;

상기 메인 컨트롤러가 출력하는 제어신호에 의해 작동이 제어되면서 상기 헤드부의 온도를 -20 ~ 10℃의 온도범위로 제어 및 유지시키는 헤드부 온도유지장치와;

각 구성요소의 작동에 필요한 전원을 제공하는 전원공급부;

를 포함하여 구성되는 기미 치료용 피부 마사지기.

청구항 2.

삭제

청구항 3.

청구항 1에 있어서,

상기 헤드부 온도유지장치는,

상기 마사지기 본체 내에 저온부가 헤드부 내측면에 밀착되도록 장착되어 상기 메인 컨트롤러가 출력하는 제어신호에 의해 작동이 제어되면서 상기 저온부를 통해 상기 헤드부를 냉각시키는 펠티에 모듈 및 그 구동회로부를 포함하여 구성되는 것을 특징으로 하는 기미 치료용 피부 마사지기.

청구항 4.

청구항 3에 있어서,

상기 헤드부 온도유지장치가 상기 메인 컨트롤러에 의해 작동이 제어될 수 있도록 마사지기 본체 내에 설치되고 마사지기 본체의 통풍구를 통해 공기를 흡입 및 송풍하여 상기 펠티에 모듈의 고온부인 히트 싱크를 강제 냉각시키는 냉각팬을 더 포함하여 구성되는 것을 특징으로 하는 기미 치료용 피부 마사지기.

청구항 5.

청구항 1에 있어서,

상기 헤드부 온도제어장치를 미리 정해진 시간 동안 작동시킬 수 있도록 마사지 시간을 입력하기 위한 다수의 입력 스위치 및 마사지기 본체 내에 메인 컨트롤러와 연결되어 내장되는 타이머를 더 포함하는 것을 특징으로 하는 기미 치료용 피부 마사지기.

청구항 6.

Petitioner Therabody Ex-1004, 0541

청구항 1에 있어서,

상기 마사지기 본체 외측에 설치되어 메인 컨트롤러에 의해 제어되면서 작동 여부 및 상태, 헤드부 온도를 포함한 기기의 상태 정보를 표시해주는 표시수단을 더 포함하는 것을 특징으로 하는 기미 치료용 피부 마사지기.

청구항 7.

청구항 1에 있어서,

상기 헤드부 온도유지장치는,

상기 마사지기 본체 내 메인 컨트롤러의 신호를 받아 냉각수의 온도를 제어하여 공급하는 수냉장치 본체와;

상기 마사지기 본체 내에서 일부가 상기 헤드부 내측면에 밀착 결합되고 양단이 마사지기 본체 하단의 유입구부와 배출구부에 연결되는 수냉튜브와;

상기 수냉장치 본체와 마사지기 본체의 수냉튜브 사이에 냉각수가 순환될 수 있도록 수냉장치 본체의 유입구부 및 배출구부와 마사지기 본체의 유입구부 및 배출구 사이를 연결하는 연결튜브;

를 포함하여 구성되어서, 상기 수냉장치 본체로부터 공급되어 상기 수냉튜브를 따라 흐르는 냉각수에 의해 상기 헤드부를 냉각시키는 수냉방식으로 이루어진 것을 특징으로 하는 기미 치료용 피부 마사지기.

청구항 8.

청구항 7에 있어서,

상기 수냉장치 본체는,

냉각수가 저장되는 공간이면서 냉각수의 공급 및 회수가 가능하도록 상기 유입구부 및 배출구부와 냉각수 관로로 연결되는 저수탱크와;

냉각수 순환을 위하여 상기 저수탱크 내 냉각수를 냉각수 관로를 통해 상기 배출구부로 압송하는 펌프와;

상기 저수탱크 내 냉각수를 냉각시키기 위하여 냉매가 순환되는 압축기, 응축기, 팽창밸브, 그리고 상기 저수탱크 내에 설치되는 증발기 기능의 냉각코일을 포함하여 구성되는 냉동사이클을 이용한 냉각장치부와;

통신 케이블을 통해 상기 마사지기 본체의 메인 컨트롤러와 상호 통신 가능하게 연결되어 상기 메인 컨트롤러로부터 전송되는 신호에 따라서 상기 펌프 및 냉각장치부의 작동을 온/오프 제어하는 보조 컨트롤러;

를 포함하는 것을 특징으로 하는 기미 치료용 피부 마사지기.

청구항 9.

삭제

청구항 10.

청구항 8에 있어서,

Petitioner Therabody Ex-1004, 0542

상기 수냉장치 본체 내에서 상기 저수탱크로부터 배출된 냉각수가 흐르게 되는 냉각수 관로 일측에 상기 보조 컨트롤러에 의해 작동이 온/오프 제어되는 발열코일을 포함한 히팅부가 설치되는 것을 특징으로 하는 기미 치료용 피부 마사지기.

명세서

발명의 상세한 설명

발명의 목적

발명이 속하는 기술 및 그 분야의 종래기술

본 발명은 가정에서 누구나 손쉽게 이용할 수 있는 기미 전문 치료용 피부 마사지기에 관한 것으로서, 더욱 상세하게는 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 제어 및 유지되는 헤드부를 구비하여 사용자가 저온 유지되는 상기 헤드부를 피부에 접촉시켜 일정시간 마사지하는 경우 기미 축소 및 치료의 효과를 거둘 수 있게 한 기미 치료용 피부 마사지기에 관한 것이다.

피부는 몸과 마음의 건강 상태를 반영하며, 깨끗한 피부는 상대방으로부터 쉽게 호감을 살 수 있도록 하기 때문에 최근 들어 여성은 물론이고 남성들도 피부 미용에 부쩍 많은 관심을 보이고 있다.

특히, 피부가 민감한 사람들에게는 자외선, 오염된 공기, 스트레스 등의 외부 자극에 곧바로 영향을 받기 때문에 각자 나름대로 피부 미용에 많은 주의 및 노력들을 기울이고 있다.

한편, 여성에게 주로 나타나는 피부 트러블 중 가장 흔한 것이 기미라 할 수 있으며, 이 기미는 주로 뺨, 이마, 코, 턱 등 얼굴의 중심부위에 연한 갈색이나 암갈색 심지어는 검은색의 과색소성 병변이 발생하는 질환이다.

기미는 주로 여성에게 발생하나 드물게 남성에게 생기는 경우도 있으며, 매우 흔한 질환이지만 아직까지는 정확한 원인이 알려져 있지 않다.

대개는 태양광선의 과잉 노출, 유전적 소인, 임신 등이 원인이며, 피임약의 복용과도 관련이 있는 것으로 알려져 있다.

기미는 언급했듯이 햇빛에 노출된 부위에 주로 생기며, 햇빛이 강한 봄, 여름에는 심해지나 겨울에는 많이 옅어지는 것으로 보아 햇빛에의 노출을 피하는 것이 기본적인 치료가 된다.

즉, 햇빛을 차단하기 위해 햇빛이 뜨거운 시간에는 활동을 가급적 피하거나 모자나 양산, 자외선 차단제 등을 이용해서 피부를 햇빛으로부터 보호해 주는 것이 기미 방지 및 개선을 위해 효과가 있다.

그 밖에 비타민을 복용하거나 기미 치료용 도포제 및 미백제, 기타 화장품을 도포하는 방법이 이용되고 있는데, 이들을 피부에 바르는 경우 치료 효과가 나타나기까지에는 수개월 이상이 걸리므로 꾸준한 노력이 필요하고, 치료반응의 판정을 위해 정기적인 검진이 필요하다.

그리고, 레이저 요법, 박피술, 이온영동법 등을 시도할 수 있는데, 전문의와 상담 후 자신의 상태에 맞추어 적절한 치료법을 선택받아야 하고, 확실한 치료 효과 및 부작용 방지를 위해서는 전문적인 시술이 필요하다.

기미는 일단 치료가 된 후에도 햇빛에 의해 쉽게 재발될 수 있으므로 자외선 차단제를 바르거나 햇빛 노출을 피하는 등 계속적인 주의가 필요하며, 지속적인 관리가 필요하다.

그러나, 기미 축소 및 치료를 위해 장기간 치료제를 복용 또는 바르거나 병원에서 전문시술을 받는 경우 들어가는 비용 및 시간이 만만치 않으며, 이러한 방법들이 누구나 손쉽게 지속적으로 이용할 수 있는 방법이라고는 할 수 없다.

특히, 복용하거나 바르는 치료제의 경우 장기간 사용시 사용자 특성 및 피부 특성에 따라 부작용이 발생할 수 있는 위험이 있다.

Petitioner Therabody Ex-1004, 0543

따라서, 치료 및 개선을 목적으로 저렴한 비용으로 가정에서 손쉽게 이용할 수 있고, 어떤 부작용 없이 주 치료방법 또는 보조적인 방법으로 꾸준히 이용할 수 있는 수단 및 방법이 필요하다.

피부 관리의 목적으로 가정에서 쉽게 사용할 수 있는 장치의 일 예로는 최근 피부 미용에 대한 관심이 부쩍 늘면서 점차 사용이 늘고 있는 다양한 목적의 피부 마사지기들을 들 수 있다.

이들은 대개 원적외선의 복사열, 저주파, 저주파 진동, 초음파 진동 등을 이용하는 것으로, 각각 나름대로 사용목적을 가지고 판매되고 있다.

하지만, 기미가 흔한 피부 트러블임에도 불구하고 시중에 판매되고 있는 피부 마사지기 중에는 기미 치료 및 완화를 전문으로 하는 피부 마사지기는 없는 형편이다.

이에 가정에서 누구나 손쉽게 이용할 수 있는 기미 치료용 피부 마사지기의 개발이 절실하게 되었다.

발명이 이루고자 하는 기술적 과제

따라서, 본 발명은 상기와 같은 문제점을 해결하기 위하여 발명한 것으로서, 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 제어 및 유지되는 헤드부를 구비하여 사용자가 저온 유지되는 상기 헤드부를 피부에 접촉시켜 일정시간 마사지하는 경우 기미 축소 및 치료의 효과를 거둘 수 있게 구성됨으로써, 저렴한 비용으로 가정에서 누구나 손쉽게 이용할 수가 있고, 또한 어떠한 부작용 발생 없이 장기간 지속적으로 이용할 수 있는 기미 전문 치료용 피부 마사지기를 제공하는데 그 목적이 있다.

발명의 구성

이하, 첨부한 도면을 참조하여 본 발명을 상세히 설명하면 다음과 같다.

본 발명은, 하측으로 손잡이부가 형성되고 온/오프 스위치를 포함한 구성요소들이 설치되는 마사지기 본체와; 사용자가 상기 마사지기 본체의 손잡이부를 잡고 피부에 접촉시켜 마사지를 할 수 있도록 상기 마사지기 본체 상단부에 설치되는 열전도 재질의 헤드부와; 상기 헤드부의 온도를 검출하기 위하여 설치되는 온도센서와; 상기 온도센서의 신호를 입력받아 이를 기초로 상기 헤드부의 온도를 소정의 저온상태로 제어 및 유지하기 위한 제어신호를 출력하는 메인 컨트롤러와; 상기 메인 컨트롤러가 출력하는 제어신호에 의해 작동이 제어되면서 상기 헤드부의 온도를 소정의 저온상태로 제어 및 유지시키는 헤드부 온도유지장치와; 각 구성요소의 작동에 필요한 전원을 제공하는 전원공급부;를 포함하여 구성되는 기미 치료용 피부 마사지기에 특징이 있는 것이다.

또한, 상기 헤드부가 상기 온/오프 스위치의 온 조작시에 상기 온도센서, 메인 컨트롤러 및 헤드부 온도유지장치에 의해 -20℃ ~ 10℃의 온도범위로 온도 제어 및 유지되는 것을 특징으로 한다.

또한, 상기 헤드부 온도유지장치가, 상기 마사지기 본체 내에 저온부가 헤드부 내측면에 밀착되도록 장착되어 상기 메인 컨트롤러가 출력하는 제어신호에 의해 작동이 제어되면서 상기 저온부를 통해 상기 헤드부를 냉각시키는 펠티에 모듈 및 그 구동회로부를 포함하여 구성되는 것을 특징으로 한다.

또한, 상기 헤드부 온도유지장치가 상기 메인 컨트롤러에 의해 작동이 제어될 수 있도록 마사지기 본체 내에 설치되고 마사지기 본체의 통풍구를 통해 공기를 흡입 및 송풍하여 상기 펠티에 모듈의 고온부인 히트 싱크를 강제 냉각시키는 냉각팬을 더 포함하여 구성되는 것을 특징으로 한다.

또한, 상기 헤드부 온도유지장치를 미리 정해진 시간 동안 작동시킬 수 있도록 마사지 시간을 입력하기 위한 다수의 입력 스위치 및 마사지기 본체 내에 메인 컨트롤러와 연결되어 내장되는 타이머를 더 포함하는 것을 특징으로 한다.

또한, 상기 마사지기 본체 외측에 설치되어 메인 컨트롤러에 의해 제어되면서 작동 여부 및 상태, 헤드부 온도를 포함한 기기의 각종 상태 정보를 표시해주는 표시수단을 더 포함하는 것을 특징으로 한다.

또한, 상기 헤드부 온도유지장치가, 상기 마사지기 본체 내 메인 컨트롤러의 신호를 받아 냉각수를 저온상태로 온도 제어 및 공급하는 수냉장치 본체와; 상기 마사지기 본체 내에서 일부가 상기 헤드부 내측면에 밀착 결합되고 양단이 마사지기

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본체 하단의 유입구부와 배출구부에 연결되는 수냉튜브와; 상기 수냉장치 본체와 마사지기 본체의 수냉튜브 사이에 냉각수가 순환될 수 있도록 수냉장치 본체의 유입구부 및 배출구부와 마사지기 본체의 유입구부 및 배출구 사이를 연결하는 연결튜브;를 포함하여 구성되고, 상기 수냉장치 본체로부터 공급되어 상기 수냉튜브를 따라 흐르는 냉각수에 의해 상기 헤드부를 냉각시키는 수냉방식인 것을 특징으로 한다.

또한, 상기 수냉장치 본체는, 냉각수가 저장되는 공간이면서 냉각수의 공급 및 회수가 가능하도록 상기 유입구부 및 배출구부와 냉각수 관로로 연결되는 저수탱크와; 냉각수 순환을 위하여 상기 저수탱크 내 냉각수를 냉각수 관로를 통해 상기 배출구부로 압송하는 펌프와; 상기 저수탱크 내 냉각수를 냉각시키기 위하여 설치되는 냉각장치부와; 통신 케이블을 통해 상기 마사지기 본체의 메인 컨트롤러와 상호 통신 가능하게 연결되어 상기 메인 컨트롤러로부터 전송되는 신호에 따라서 상기 펌프 및 냉각장치부의 작동을 온/오프 제어하는 보조 컨트롤러;를 포함하는 것을 특징으로 한다.

또한, 상기 냉각장치부가 냉매가 순환되는 압축기, 응축기, 팽창밸브, 그리고 상기 저수탱크 내 냉각수를 냉각시키기 위하여 저수탱크 내 설치되는 증발기 기능의 냉각코일을 포함하여 구성되는 냉동사이클을 이용하는 냉각장치인 것을 특징으로 한다.

또한, 상기 수냉장치 본체 내에서 상기 저수탱크로부터 배출된 냉각수가 흐르게 되는 냉각수 관로 일측에 상기 보조 컨트롤러에 의해 작동이 온/오프 제어되는 발열코일을 포함한 히팅부가 설치되는 것을 특징으로 한다.

이하, 첨부한 도면을 참조하여 본 발명을 더욱 상세히 설명하면 다음과 같다.

본 발명은 체온보다 낮은 특정의 저온으로 피부를 일정시간 마사지할 경우 기미가 축소되는 효과를 이용하는 것으로, 저렴한 비용으로 가정에서 누구나 손쉽게 이용할 수 있는 기미 전문 치료용 피부 마사지기에 관한 것이다.

도 1은 본 발명에 따른 피부 마사지기의 제1실시예를 도시한 사시도이고, 도 2는 도 1의 선 'A-A'를 따라 취한 단면도이며, 도 3은 도 1의 제1실시예에서 주요 구성요소를 도시한 블럭도이다.

본 발명에 따른 피부 마사지기는 체온보다 낮은 특정의 저온으로 기미가 발생된 피부를 일정시간 마사지할 수 있도록 구성되는 것으로, 이러한 저온 마사지를 위하여 손잡이가 형성된 마사지기 본체(100)에 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 제어 및 유지되는 헤드부(110)가 설치되어 이루어진 것이다.

이러한 본 발명의 바람직한 제1실시예의 구성을 상세히 설명하면 다음과 같다.

우선, 본 발명의 제1실시예는, 손잡이부(101)가 형성되고 온/오프 스위치(102)를 포함한 구성요소들이 설치되는 마사지기 본체(100)와, 이 마사지기 본체(100) 상단부에 장착되어 실제 피부에 접촉시켜 마사지를 하게 되는 부분인 헤드부(110)와, 이 헤드부(110)를 소정의 저온상태로 온도 제어 및 유지하기 위한 헤드부 온도유지장치와, 이 헤드부 온도유지장치를 포함한 각 구성요소들을 제어하게 되는 메인 컨트롤러(130)와, 작동에 필요한 전원을 제공하는 전원공급부(140)와, 작동여부 및 상태 등 각종 정보를 표시하기 위한 표시수단을 포함하여 이루어진다.

여기서, 상기 마사지기 본체(100)는 하측으로 사용자가 용이하게 잡을 수 있는 손잡이부(101)가 형성된 것으로서, 사용자가 상기 손잡이부(101)를 잡고 마사지를 할 수 있도록 상단부에 헤드부(110)가 설치되고, 내/외부에는 각종 구성요소들이 장착된다.

상기 마사지기 본체(100)에 내장되는 구성요소로서, 상기 전원공급부(140)는 각 구성요소의 작동에 필요한 전원을 제공하기 위한 것으로, 그 구성 및 전원공급을 위한 전기적 연결관계는 당업자의 요구에 따라 다양한 변형이 가능하므로 특정한 것에 한정하지는 않는다.

또한, 상기 전원공급부(140)로는 감전 및 누전사고를 예방하고 실외 휴대 및 사용이 가능하도록 1차 전지(1회용 배터리) 또는 2차 전지(충전지)를 사용할 수 있으며, 당업자의 요구에 따라 어댑터를 통해 220V의 가정용 전원에 연결하여 사용할 수도 있다.

물론, 상기 2차 전지가 사용되는 경우 통상의 소형 가전제품에서와 마찬가지로 전지가 모두 소모된 후 어댑터를 가정용 전원에 연결하여 전지를 충전시킬 수 있도록 그에 필요한 회로구성이 마사지기 본체(100) 내에 함께 구비되어야 함이 마땅하다.

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다음으로, 상기 헤드부(110)는 사용자가 마사지기 본체(100)의 손잡이부(101)를 손으로 잡은 상태에서 불편함 없이 피부에 접촉시켜 마사지할 수 있도록 마사지기 본체(100)의 상단부에 소정 형상으로 돌출시켜 설치하며, 원형 또는 타원형, 기타 다양한 형상으로 구비되어 설치될 수 있다.

도면에 개시되고 있는 마사지기 본체(100)와 헤드부(110)는 피부 마사지라는 사용목적에 맞게 그 형상 및 구조가 적절히 변경 가능하며, 도시한 예는 실시 가능한 형상 및 구조의 예를 나타내는 것일 뿐 본 발명이 이에 한정되는 것은 아니다.

상기 헤드부(110)는 그 안쪽으로 내장된 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 유지될 수 있도록 헤드부 온도유지장치와 열전달이 가능하게 직접 또는 간접적으로 결합되어진다.

상기 헤드부(110)의 재질로는 피부에 접촉시켜 마사지하는 부분이므로 기본적으로 인체에 무해한 재질을 사용해야 하며, 헤드부 온도유지장치의 흡열작용에 의해 저온상태로 냉각될 수 있어야 하고 피부의 열을 헤드부 온도유지장치로 전달시켜 피부를 냉각시켜야 하므로 열전도성이 좋은 재질을 사용한다.

한편, 본 발명의 제1실시예에서 헤드부(110)를 저온상태로 냉각시키기 위한 헤드부 온도유지장치(120)는 펠티에 모듈(121)(peltier module) 및 그 구동회로부(122)로 구성된다.

도 4는 본 발명의 제1실시예에 채용되는 펠티에 모듈의 기본 개념을 설명하기 위한 도면으로서, 주지된 바와 같이 펠티에 모듈(121)은 직류 전류에 의해 자유로이 냉각, 가열, 온도 제어를 하는 열전 반도체 소자(123)를 포함하여 구성되는 것으로, 냉각 및 가열, 온도 제어가 필요한 여러 산업분야에 이미 널리 사용되고 있는 장치이다.

컨트롤러 제어에 의해 작동에 필요한 직류 전류를 적절히 인가받음에 따라 냉각, 가열, 온도 제어를 수행하는 펠티에 모듈 및 그 구동회로부의 세부적인 회로구성 및 전기적 연결관계, 컨트롤러와의 전기적 연결관계 등에 대해서는 이미 공지의 기술이므로, 본 명세서에서는 본 발명의 명확한 이해를 위해 반드시 설명되어야 할 부분, 즉 펠티에 모듈의 기본 설명 및 개념, 작동원리, 이를 채용하여 헤드부를 냉각하는 원리에 대해서만 언급하기로 한다.

상기 펠티에 모듈(121)에서는 직류 전류를 인가함으로써 열전 반도체 소자(123) 양면에 온도차가 발생하도록 되어 있고, 이때 열전 반도체 소자(123)가 저온부(도면부호 124a 부분임)에서 흡열, 고온부(도면부호 124b,127 부분임)에서 발열이 일어나 저온부측에서 고온부측으로 열을 이동시키는 열 펌프 역할을 하게 된다.

상기 펠티에 모듈(121)에서는 인가되는 전류의 극성을 바꾸기만 하면 열이 흐르는 방향을 바꿀 수 있고, 전류의 세기를 바꿈으로써 이동되는 열량의 크기를 바꿀 수 있는 바, 이에 냉각, 가열, 온도 제어가 쉽게 이루어질 수 있다.

상기 펠티에 모듈(121)은 도시된 바와 같이 두 개의 세라믹 기판(124a,124b) 사이에 2개 이상의 P형 및 N형 열전 반도체 소자(123) 쌍들이 솔더 플레이트(solder plate)(125a,125b)에 의해 고정되어 있는 구조를 가지며, 이때 열전 반도체 소자(123)들은 전기적으로는 직렬구조로, 열적으로는 병렬구조로 구성된다.

여기서, 양측의 세라믹 기판(124a,124b)은 각각 펠티에 모듈(121)에서의 저온부와 고온부가 되며, 냉각대상체(126)와 히트 싱크(heat sink)(127)를 전기적으로 절연시키는 역할을 하게 된다.

이러한 펠티에 모듈(121)은 압축기와 냉매를 가진 일반적인 냉동 사이클을 채용한 방식과 비교해서 다음과 같은 특징을 가지고 있다.

- CFC 냉매를 사용하지 않으며, 소형, 경량이고, 모양을 자유롭게 선택할 수 있다.

- 전류의 방향을 바꾸기만 하면 냉각뿐만 아니라 가열도 가능하고, 냉각과 가열의 양 기능을 가지므로 상온에서의 온도 제어가 가능하다.

- 온도 응답성이 좋으며, 가동부분이 없으므로 진동, 소음이 없고, 피로 및 파손되는 기계부분이 없으므로 수명이 길고 높은 신뢰성을 가진다.

- 전기 배선뿐이므로 취급이 간단하다.

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도 4는 본 발명에서 헤드부 온도유지장치로 채용되는 펠티에 모듈의 구성 및 작동원리를 설명하기 위한 기본적인 예를 도시한 것일 뿐, 실제 본 발명에 적용하기 위해서는 여러 형태로의 변경이 가능하며, 본 발명이 도시한 예에 한정되는 것은 아니다.

본 발명에서는 상기 펠티에 모듈(121)이 마사지기 본체(100) 내에서 헤드부(110) 바로 안쪽에 위치하도록 설치되며, 특히 저온부의 세라믹 기판(124a)이 헤드부(110)의 내측면에 열 흡수가 가능하도록 직접 밀착되어 설치된다.

결국, 펠티에 모듈(121)의 저온부(124a)의 흡열작용에 의해 이에 접촉된 헤드부(110)가 냉각되고, 이와 같이 헤드부(110)가 냉각된 후 저온으로 유지되는 상태에서 사용자가 마사지를 하게 되면 피부의 열이 헤드부(110)를 통해 펠티에 모듈(121)의 저온부(124a)로 흡열되면서 저온상태의 피부 마사지가 가능해진다.

한편, 본 발명에 따른 기미 치료용 피부 마사지기는 전술한 바와 같이 특정 저온에서 피부를 일정시간 마사지하는 경우 기미가 축소되는 효과가 있음을 이용하는 것으로, 헤드부(110)가 그 안쪽의 헤드부 온도유지장치(120)에 의해 저온상태로 온도 제어 및 유지될 때 이 헤드부(110)를 통해 피부를 마사지하게 되면 기미 축소 및 치료 효과를 얻을 수 있게 한 것이다.

본 발명에서 헤드부(110)는 사용 중에 헤드부 온도유지장치(120), 즉 상기 펠티에 모듈(121) 및 그 구동회로부(122)의 작동에 의해 저온상태를 유지하게 되는데, 이때 펠티에 모듈(121) 및 구동회로부(122)의 작동은 메인 컨트롤러(130)가 출력하는 제어신호에 의해 제어된다.

즉, 상기 메인 컨트롤러(130)는 사용 중에 펠티에 모듈(121) 및 구동회로부(122)를 적절히 온/오프 제어하여 헤드부(110)의 온도를 소정의 저온상태로 일정하게 유지시킨다.

본 발명에서 헤드부(110)의 온도는 -20℃ ~ 10℃의 온도범위로 유지되도록 하는 것이 바람직하다.

상기 헤드부(110)의 온도를 -20℃ ~ 10℃의 저온상태로 유지하기 위해서는 상기 메인 컨트롤러(130)가 헤드부(110)의 온도를 입력받아야 하고, 또한 메인 컨트롤러(130)는 입력되는 온도에 따라 펠티에 모듈(121) 및 구동회로부(122)를 적절히 제어하여 헤드부(110)의 온도가 상기 온도범위를 유지하도록 함이 마땅하다.

따라서, 상기 헤드부(110)의 내측면에는 헤드부(110)의 온도를 검출하기 위한 온도센서(111)가 부착되며, 이 온도센서(111)가 검출하는 헤드부(110)의 온도가 메인 컨트롤러(130)에 입력되도록 한다.

결국, 본 발명의 피부 마사지기에서는 사용 중(온/오프 스위치의 온)에 상기 메인 컨트롤러(130)가 온도센서(111)의 신호를 기초로 펠티에 모듈(121) 및 구동회로부(122)의 작동을 적절히 제어하여 헤드부(110)의 온도를 본 발명에서 제시한 저온범위, 즉 -20℃ ~ 10℃의 온도범위로 실시간 제어할 수 있게 된다.

그리고, 상기 펠티에 모듈(121)에서 고온부측에 설치되는 히트 싱크(127)의 방열효과를 높이기 위하여, 상기 마사지기 본체(100)의 일측과 타측에 통풍구(103,104)를 설치하고, 마사지기 본체(100) 내부의 일측 통풍구(103)쪽에 공기 흡입 후 히트 싱크(127) 주변으로 강제 송풍하는 소형 냉각팬(129)을 추가로 설치할 수 있으며, 이 냉각팬(129) 역시 메인 컨트롤러(130)가 출력하는 제어신호에 의해 구동이 제어될 수 있게 한다.

또한, 도 3에 도시한 바와 같이, 미리 정해진 시간 동안 마사지기를 작동시킬 수 있도록 마사지 시간을 입력하기 입력 스위치(도 1에서 도면부호 131)들과 타이머(132)가 메인 컨트롤러(130)와 연결되어 설치될 수 있는데, 사용자가 입력 스위치(131)들을 이용하여 마사지 시간을 입력하게 되면, 펠티에 모듈(121)을 온/오프 제어할 수 있는 메인 컨트롤러(130)가 타이머(132)의 작동에 따라 펠티에 모듈(121)을 미리 정해진 시간 동안만 작동시켜 사용자로 하여금 일정시간 저온 마사지를 실시할 수 있도록 한다.

한편, 도 1에 도시한 바와 같이, 마사지기 본체(100) 외측으로 피부 마사지기를 온/오프 조작하기 위한 온/오프 스위치(102)가 설치되며, 또한 마사지기의 작동상태 등 각종 정보를 알려주기 위한 표시수단이 설치된다.

상기 표시수단은 메인 컨트롤러(130)에 의해 작동이 제어되는 것으로, 도시한 바와 같이 LCD(151) 및 다수의 LED(152,153)로 구성될 수 있다.

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상기 LCD(151)는 마사지기의 고장 여부 및 작동상태, 배터리 잔량 또는 충전지의 충전상태, 온도센서(111)에 의해 검출되는 헤드부(110)의 현재 온도 등 마사지기의 각종 정보를 표시하도록 구비되며, 상기 LED로는 충전표시용 LED(152), 온/오프 표시용 LED(153) 등이 설치될 수 있다.

물론, 별도 LED를 설치하는 대신 LCD(151)가 충전표시 및 온/오프 표시 기능을 가지도록 구성될 수도 있으며, 이러한 표시수단은 본 발명에서 당업자의 요구에 따라 다양한 변형이 가능하므로 특정한 것에 한정하지는 않는다.

도 1에서 도면부호 133은 회로를 구성하는 인쇄회로기판을 나타낸다.

이와 같이 하여, 본 발명의 제1실시예는 헤드부 온도유지장치로서 펠티에 모듈(121)을 채용한 피부 마사지기로서, 헤드부(110) 안쪽에 냉각작용을 하는 펠티에 모듈(121)을 설치하여, 헤드부(110)가 상기 펠티에 모듈(121)에 의해 저온상태를 유지할 수 있게 구성됨으로써, 사용자가 저온상태의 헤드부(110)를 통해 피부를 일정시간 마사지하는 경우 기미 축소 및 치료의 효과를 거둘 수 있도록 제공되는 것이다.

이러한 본 발명의 제1실시예는 휴대가 간편하고 실내 및 실외 등 장소에 구애됨 없이 언제 어디서나 편리하게 사용할 수 있다.

한편, 도 5는 본 발명에 따른 피부 마사지기의 제2실시예를 도시한 사시도이고, 도 6은 도 5의 선 'B-B'를 따라 취한 단면도이다.

또한, 도 7은 도 5의 제2실시예에서 수냉장치 본체의 내부 구성을 도시한 개략도이고, 도 8은 도 5의 제2실시예에서 주요 구성요소를 도시한 블럭도이다.

이러한 본 발명의 바람직한 제2실시예의 구성에 대하여 상세히 설명하면 다음과 같다.

본 발명의 제2실시예는 체온보다 낮은 특정의 저온으로 피부를 일정시간 마사지할 경우 기미가 축소되는 효과를 이용하는 것으로서, 치료 원리가 제1실시예와 같고, 마사지기 본체(100)에 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 제어 및 유지되는 헤드부(110)를 구비한 점이 같다.

다만, 본 발명의 제2실시예는 헤드부(110)를 저온상태로 온도 제어 및 유지하기 위한 수단, 즉 헤드부 온도유지장치(160)의 구성이 제1실시예와 차이가 있는 것으로, 제1실시예에서는 펠티에 모듈이 채용되었으나, 제2실시예에서는 헤드부(110)를 저온상태로 제어하기 위하여 물을 이용하는 수냉방식이 채용된다.

구성을 설명하면, 본 발명의 제2실시예는, 손잡이부(101)가 형성되고 온/오프 스위치(102)를 포함한 구성요소들이 설치되는 마사지기 본체(100)와, 이 마사지기 본체(100) 상단부에 장착되어 실제 피부에 접촉시켜 마사지를 하게 되는 부분인 헤드부(110)와, 이 헤드부(110)를 소정의 저온상태로 온도 제어 및 유지하기 위한 헤드부 온도유지장치와, 이 헤드부 온도유지장치를 포함한 각 구성요소들을 제어하게 되는 메인 컨트롤러(130)와, 작동에 필요한 전원을 제공하는 전원공급부(140)와, 작동 여부 및 상태 등 각종 정보를 표시하기 위한 표시수단을 포함하여 이루어진다.

본 발명의 제2실시예에서 마사지기 본체(100)의 손잡이부(101), 헤드부(110), 전원공급부(140), 표시수단은 제1실시예에서 설명한 바와 같다.

다만, 상기 헤드부(110)가 그 안쪽으로 내장된 헤드부 온도유지장치(160)의 수냉튜브(161)에 의해 소정의 저온상태로 온도 제어 및 유지될 수 있도록 수냉튜브(161)와 열전달이 가능하게 직접 또는 간접적으로 결합되어진다.

상기 헤드부(110)의 재질로는 피부에 접촉시켜 마사지하는 부분이므로 기본적으로 인체에 무해한 재질을 사용해야 하며, 안쪽면에 밀착된 수냉튜브(161)의 흡열작용에 의해 저온상태로 냉각될 수 있어야 하고 피부의 열을 수냉튜브(161)쪽으로 전달시켜 피부를 냉각시켜야 하므로 열전도성이 좋은 재질을 사용한다.

상기 헤드부(110)는 피부에 접촉시켜 마사지를 하게 될 때 수냉튜브(161) 내에 흐르는 냉각수에 의해 냉각되어 저온상태로 제어 및 유지되는 바, 마사지기 본체(100) 내에서 수냉튜브(161)는 일부가 헤드부(110) 안쪽면을 통과하도록 설치된다.

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즉, 도 7에 도시한 바와 같이, 수냉튜브(161)의 일부가 일정간격의 지그재그 형태로 절곡 형성되어 헤드부(110) 안쪽면 홈부분(111a)에 넣어져 밀착 결합되는 바, 표면간 밀착된 상태로 헤드부(110)와 수냉튜브(161)의 냉각수 사이에는 열교환이 이루어지게 되어 있다.

상기 수냉튜브(161)는 헤드부(110)와 밀착 결합된 부분, 즉 열교환이 이루어지는 일부분 또는 그 전체가 열전도성이 좋은 금속을 재질로 하여 제작된다.

한편, 상기 수냉튜브(161)는 그 전체가 마사지기 본체(100) 내에 설치되고, 그 양단이 마사지기 본체(100) 하단에 구비된 유입구부(105a)와 배출구부(105b)에 각각 연결되어, 유입구부(105a)를 통해 유입된 냉각수가 수냉튜브(161)를 따라 흐른 후 배출구부(105b)를 통해 배출되게 되어 있다.

상기 마사지기 본체(100)의 유입구부(105a)와 배출구부(105b)에는 헤드부 온도유지장치로서 채용된 수냉장치 본체(163)로부터 연결된 연결튜브(162a,162b)를 각각 연결하여 사용하도록 되어 있다.

결국, 수냉장치 본체(163) 내부를 순환하여 냉각된 냉각수가 상기 유입구부(105a)로 연결된 일측의 연결튜브(162a)를 통해 마사지기 본체(100) 내부의 수냉튜브(161)를 통과하면서 헤드부(110)를 냉각시키고, 이후 수냉튜브(161)를 거쳐 마사지기 본체(100)의 배출구부(105b)를 통해 외부로 배출된 냉각수는 타측의 연결튜브(162b)를 따라 다시 수냉장치 본체(163)로 유입된 후 그 내부에서 순환되어 냉각된다.

결국, 냉각수는 마사지기 본체(100)와 수냉장치 본체(163) 사이를 계속해서 순환하면서 헤드부(110)를 적절히 냉각하여 소정의 저온상태로 온도 제어 및 유지시키게 되는 것이다.

상기와 같이 본 발명의 제2실시예에서는 헤드부(110)를 저온상태로 온도 제어 및 유지시키기 위한 헤드부 온도유지장치로서 냉각수를 이용하는 수냉방식을 채용하는 것으로, 이 헤드부 온도유지장치(160)는 헤드부(110) 냉각을 위한 냉각수가 흐르게 되는 마사지기 본체(100) 내부의 수냉튜브(161)와, 냉각수를 저장 및 저온상태로 온도 제어하여 공급하는 수냉장치 본체(163)와, 상기 수냉튜브(161)와 수냉장치 본체(163) 사이를 연결하는 연결튜브(162a,162b)를 포함하며, 수냉장치 본체(163) 내에는 냉각수가 저장되고 냉각되는 공간인 저수탱크(164)와, 이 저수탱크(164) 내 냉각수를 압송하기 위한 소형펌프(167)와, 저수탱크(164) 내 냉각수를 냉각시키기 위한 냉각장치부(170)가 설치된다.

여기서, 상기 마사지기 본체(100)와 수냉장치 본체(163) 사이에는 2개의 연결튜브(162a,162b)가 사용되며, 수냉장치 본체(163)의 배출구부(166a)와 유입구부(166b)에 연결된 연결튜브(162a,162b)를 각각 마사지기 본체(100)의 유입구부(105a)와 배출구부(105b)에 연결하여 사용하게 된다.

2개의 연결튜브(162a,162b) 중 하나는 수냉장치 본체(163)에서 냉각된 냉각수를 마사지기 본체(100)로 흐르게 하기 위한 연결튜브이고, 다른 하나는 마사지기 본체(100)에서 배출되는 냉각수를 다시 수냉장치 본체(163)로 흐르게 하기 위한 연결튜브이다.

상기 저수탱크(164)에는 도 9에 도시한 바와 같이 저장된 냉각수를 냉각시키기 위한 냉각장치부(170)의 냉각코일(174)이 설치되고, 저수탱크(164)의 배출구부(165a)와 유입구부(165b)가 각각 수냉장치 본체(163)의 배출구부(166a)와 유입구부(166b)에 냉각수 관로(169a,169b,169c)를 통해 연결된다.

그리고, 상기 저수탱크(164)의 배출구부(165a)와 수냉장치 본체(163)의 배출구부(166a) 사이를 연결하는 냉각수 관로(169a,169b) 상에는 냉각수 순환을 위한 소형펌프(167)가 설치된다.

결국, 상기 저수탱크(164) 내에서 냉각코일(174)에 의해 냉각된 냉각수가 소형펌프(167)의 구동에 의해 냉각수 관로(169b)를 통해 압송되면, 이후 냉각수는 수냉장치 본체(163)의 배출구부(166a)를 통해 연결튜브(162a)로 흐른 후 마사지기 본체(100) 내 수냉튜브(161)로 흐르게 되고, 이어 헤드부(110)를 냉각한 냉각수가 다시 수냉튜브(161), 연결튜브(162b), 냉각수 관로(169c)를 차례로 거쳐 다시 저수탱크(164)로 회수된다.

이와 같이 냉각수는 소형펌프(167)의 구동에 의하여 저수탱크(164) → 냉각수 관로 A(169a) → 소형펌프(167) → 냉각수 관로 B(169b) → 연결튜브 A(162a) → 수냉튜브(161) → 연결튜브 B(162b) → 냉각수 관로 C(169c) → 저수탱크(164)의 경로를 따라 순환되게 된다.

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한편, 상기 냉각장치부(170)는 수냉장치 본체(163) 내부에서 냉매를 순환시켜 상기 저수탱크(164) 내에 저장된 냉각수를 냉각시키는 장치로서, 냉동사이클을 이용하는 통상의 냉각장치와 동일하게 구성될 수 있으며, 따라서 공지된 바의 증발기, 압축기, 응축기 및 팽창밸브를 기본 구성으로 한다.

상기 냉각장치부(170)의 구성에 대해 설명하면, 도 10에 도시한 바와 같이 저온, 저압의 냉매 증기를 고온, 고압의 냉매 증기로 압축시키는 압축기(171)와, 이 압축기(171)를 통해 나온 냉매 증기를 응축시키는 응축기(172)와, 이 응축기(172)에서 응축된 냉매를 저온, 저압의 습증기상태로 팽창시키는 팽창밸브(173)와, 이 팽창밸브(173)를 통해 나온 냉매를 통과시켜 저온, 저압의 증기상태로 기화시키면서 저수탱크(164) 내 냉각수를 냉각시키는 냉각코일(174)을 포함한다.

여기서, 압축기(171), 응축기(172), 팽창밸브(173) 및 냉각코일(174)의 구성에 대해서는 냉동사이클을 이용하는 통상의 냉각장치의 구성과 같으며, 냉매가 냉매 관로를 따라 주지된 바와 같이 압축기(171) → 응축기(172) → 팽창밸브(173) → 냉각코일(174) → 압축기(171)의 경로로 순환된다.

예컨대, 압축기(171)는 냉각코일(174)에서 저온, 저압으로 증발된 냉매 증기를 흡입하는 펌프의 역할과, 흡입된 냉매 증기를 더욱 쉽게 응축될 수 있도록 고온, 고압의 증기로 압축하는 역할과, 압축의 힘으로 냉매를 냉매 관로를 통해 순환시키는 역할을 연속적으로 행한다.

본 발명에서 상기 냉각코일(174)은 저수탱크(164) 내에 설치되어 증발기 기능을 수행하는 것으로서, 저수탱크(164) 내 냉각수에 완전히 잠기도록 설치되는 바, 내부에 냉매가 흐르게 되는 냉각코일(174)이 증발기 기능을 수행하면서 저수탱크(164)에 저장된 냉각수를 냉각시키게 된다.

상기 냉각코일(174)로는 열교환 효율을 높이기 위하여 나선형으로 벤딩된 것을 사용하는 것이 바람직하며, 장기간 물에 수용된 상태에서도 부식 등의 문제가 발생하지 않도록 스테인리스 스틸(SUS)을 재질로 하는 것을 사용하는 것이 바람직하다.

상기와 같이 본 발명의 냉각장치부(170)를 구성함에 있어서, 마사지기 본체(100)의 헤드부(110)를 보다 경제적이면서 원하는 수준까지 충분히 냉각시킬 수 있도록, 냉각코일(174)의 크기 등 각 구성요소의 용량과 냉매량 등 냉각장치부(170)의 냉각용량을 적절히 설계함이 마땅하다.

본 발명의 제2실시예에서 소형펌프(167) 및 냉각장치부(170)의 작동에 필요한 전원은 수냉장치 본체(163)에 220V의 가정용 전원을 연결하여 공급하는 것이 바람직하다.

한편, 본 발명에 따른 기미 치료용 피부 마사지기는 전술한 바와 같이 특정 저온에서 피부를 일정시간 마사지하는 경우 기미가 축소되는 효과가 있음을 이용하는 것으로, 마사지기 본체(100)의 헤드부(110)가 그 안쪽의 헤드부 온도유지장치에 의해 저온상태로 온도 제어 및 유지될 때 이 헤드부(110)를 통해 피부를 마사지하게 되면 기미 축소 및 치료 효과를 얻을 수 있게 한 것이다.

본 발명의 제2실시예에서 상기 헤드부(110)는 사용 중에 헤드부 온도유지장치(160)의 작동에 의해 저온상태를 유지하게 되는데, 이때 헤드부 온도유지장치(160)의 작동은 메인 컨트롤러(130)가 출력하는 제어신호에 의해 제어된다.

즉, 상기 메인 컨트롤러(130)는 사용 중에 헤드부 온도유지장치(160)의 작동을 제어하여 헤드부(110)의 온도를 소정의 저온상태로 일정하게 유지시킨다.

상기 헤드부(110)의 온도를 -20℃ ~ 10℃의 저온상태로 유지하기 위해서는 상기 메인 컨트롤러(130)가 헤드부(110)의 온도를 입력받아야 하고, 또한 메인 컨트롤러(130)는 입력되는 온도에 따라 헤드부 온도유지장치(160)의 작동을 적절히 제어하여 헤드부(110)의 온도가 상기 온도범위를 유지하도록 함이 마땅하다.

따라서, 상기 헤드부(110)의 내측면에는 헤드부(110)의 온도를 검출하기 위한 온도센서(111)가 부착되며, 이 온도센서(111)가 검출하는 헤드부(110)의 온도가 메인 컨트롤러(130)에 입력되도록 한다.

결국, 본 발명의 피부 마사지기에서는 사용 중(온/오프 스위치의 온)에 상기 메인 컨트롤러(130)가 온도센서(111)의 신호를 기초로 헤드부 온도유지장치(160)의 작동을 적절히 제어하여 헤드부(110)의 온도를 본 발명에서 제시한 저온범위, 즉 -20℃ ~ 10℃의 온도범위로 실시간 제어할 수 있게 된다.

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또한, 도 7에 도시한 바와 같이, 미리 정해진 시간 동안 마사지기를 작동시킬 수 있도록 마사지 시간을 입력하기 입력 스위치(도 1에서 도면부호 131)들과 타이머(132)가 메인 컨트롤러(130)와 연결되어 설치될 수 있는데, 사용자가 입력 스위치(131)들을 이용하여 마사지 시간을 입력하게 되면, 펠티에 모듈(121)을 온/오프 제어할 수 있는 메인 컨트롤러(130)가 타이머(132)의 작동에 따라 펠티에 모듈(121)을 미리 정해진 시간 동안만 작동시켜 사용자로 하여금 일정시간 저온 마사지를 실시할 수 있도록 한다.

그리고, 도 5에 도시한 바와 같이, 마사지기 본체(100) 외측으로 피부 마사지기를 온/오프 조작하기 위한 온/오프 스위치(102)가 설치되며, 또한 마사지기의 작동상태 등 각종 정보를 알려주기 위한 표시수단이 설치된다.

한편, 상기 헤드부 온도유지장치(160)의 작동을 제어하기 위해서는 소형펌프(167) 및 냉각장치부(170)를 온/오프 제어해야 하는 바, 마사지기 본체(100) 내의 메인 컨트롤러(130)와는 별도로 소형펌프(167) 및 냉각장치부(170)를 온/오프 제어하기 위한 별도의 컨트롤러를 수냉장치 본체(163) 내에 위치시키는 것이 바람직하다.

이하, 본 명세서에서는 마사지기 본체(100) 내의 메인 컨트롤러(130)와 명확한 구분을 위하여 수냉장치 본체(163)의 컨트롤러를 보조 컨트롤러(168)로 칭하기로 한다.

상기 두 컨트롤러(130,168)는 마사지기 본체(100)와 수냉장치 본체(163) 사이에 연결되는 통신 케이블(106)을 통하여 상호 통신 가능하도록 연결되며, 메인 컨트롤러(130)는 온/오프 스위치(102) 조작에 따른 스위칭 신호를 입력받도록 연결되는 한편 온도센서(111)의 신호를 입력받도록 연결되고, 마사지기 본체(100) 내부에 설치된 구성요소, 즉 LCD(151) 및 LED(52,153) 등 표시수단과 타이머(132)의 작동을 제어하도록 구비된다.

또한, 상기 메인 컨트롤러(130)는 온/오프 스위치 조작 및 타이머 작동에 따른 스위칭 신호(온/오프 신호)와, 온도센서(111)로부터 입력되는 온도신호를 통신 케이블(106)을 통해 보조 컨트롤러(168)에 전송하도록 구비된다.

이에 대하여 상기 보조 컨트롤러(168)는 메인 컨트롤러(130)로부터 전송되는 스위칭 신호 및 온도신호를 입력받아 수냉장치 본체(163) 내 구성요소들의 작동을 제어하게 된다.

특히, 마사지기의 사용 중(온/오프 스위치의 온)에는, 마사지기 본체(100)의 헤드부(110)가 냉각수에 의해 냉각되어 항상 -20℃ ~ 10℃의 온도범위로 유지될 수 있도록, 즉 사용자 피부에 접촉되어 헤드부(110)가 상기 온도범위 밖으로 온도 상승되거나 냉각수에 의해 과냉되지 않도록, 상기 보조 컨트롤러(168)는 메인 컨트롤러(130)로부터 전송되는 헤드부(110)의 온도를 기초로 소형펌프(167) 및 냉각장치부(170)를 실시간으로 온/오프 제어하게 된다.

즉, 상기 보조 컨트롤러(168)는 메인 컨트롤러(130)로부터 전송되는 온도신호를 기초로 헤드부(110)의 온도가 상기 온도범위를 초과하지 않도록 소형펌프(167) 및 냉각장치부(170)를 오프시키거나, 상기 온도범위 미만이 되지 않도록 소형펌프(167) 및 냉각장치부(170)를 온(on)시키게 된다.

여기서, 상기 냉각장치부(170)의 온/오프 제어는 냉동사이클을 이용한 통상의 냉각장치에 대한 온/오프 제어와 동일하게 실시될 수 있는데, 예를 들어 압축기(171)의 구동을 온/오프 제어함으로써 냉각장치부(170)의 온/오프 제어를 수행할 수 있다.

그리고, 바람직한 실시예로서, 상기 수냉장치 본체(163) 내에서 저수탱크(164)로부터 배출된 냉각수가 흐르게 되는 냉각수 관로의 일측에는 보조 컨트롤러(168)에 의해 작동이 온/오프 제어되는 발열코일(176)로 이루어진 히팅부(175)를 설치할 수 있다.

이와 같이 발열코일(176)을 설치하는 이유는 냉각수가 과냉되었을 경우 냉각장치부(170)를 오프시킴과 동시에 냉각수를 일정수준 신속히 가열하기 위한 것으로, 마사지기 본체(100)의 헤드부(110)가 과냉되는 것을 방지하고, 헤드부(110)의 온도를 보다 신속하고 정밀하게 적극 제어할 수 있도록 설치되는 것이다.

즉, 보조 컨트롤러(168)가 메인 컨트롤러(130)로부터 전송되는 온도신호로부터 헤드부(110)가 상기 온도범위 미만으로 떨어짐(과냉)을 판단한 경우 냉각장치부(170)를 오프시킴과 동시에 상기 발열코일(176)을 작동시켜 냉각수 온도 및 헤드부 온도를 신속히 상승시킨다.

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물론, 헤드부(110)의 온도가 상기 온도범위 내로 상승하면 발열코일(176)의 작동을 오프시키고, 이후 헤드부(110)의 온도가 상기 온도범위를 초과함을 판단한 경우 냉각장치부(170)를 작동시킨다.

상기와 같이 이루어진 본 발명의 제2실시예에서는, 마사지기 본체(100) 내부에 메인 컨트롤러(130)를, 수냉장치 본체(163) 내부에 보조 컨트롤러(168)를 각각 설치하여, 두 컨트롤러(130,168)간 협조 제어에 의해 헤드부(110)의 온도가 저온상태로 제어 및 유지되도록 하고 있으나, 마사지기 본체(100) 또는 수냉장치 본체(163) 내에 하나의 컨트롤러만을 설치하여 이 컨트롤러가 통합 제어를 수행하도록 할 수도 있다.

만약 마사지기 본체(100) 내에 하나의 컨트롤러만을 설치하는 경우, 이 컨트롤러가 수냉장치 본체(163) 내의 구성요소, 즉 소형펌프(167) 및 냉각장치부(170), 히팅부(175)를 온/오프 제어하기 위한 통신 케이블(106)을 마사지기 본체(100)와 수냉장치 본체(163) 사이에 연결하여야 한다.

그리고, 만약 수냉장치 본체(163) 내에 하나의 컨트롤러만을 설치하는 경우, 이 컨트롤러가 마사지기 본체(100)에 설치된 온/오프 스위치(102)의 스위칭 신호 및 타이머(132)의 출력신호, 온도센서(111)의 출력신호를 입력받고 또한 마사지기 본체(100) 내 구성요소, 즉 타이머(132) 및 표시수단(151,152,153)을 제어할 수 있는 통신 케이블(106)을 마사지기 본체(100)와 수냉장치 본체(163) 사이에 연결하여야 한다.

물론, 통신 케이블(106)은 마사지기 본체(100)와 수냉장치 본체(163)의 잭에 연결하여 사용하게 되며, 온/오프 스위치 및 타이머, 표시수단을 모두 마사지기 본체(100)가 아닌 수냉장치 본체(163)에 설치할 수도 있다.

상기와 같이 컨트롤러의 설치, 온/오프 스위치 및 타이머, 표시수단의 설치 등은 당업자의 요구에 따라 다양한 변형이 가능하므로 특정한 것에 한정하지는 않는다.

이와 같이 하여, 본 발명은 가정에서 누구나 손쉽게 이용할 수 있는 기미 전문 치료용 피부 마사지기에 관한 것으로서, 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 제어 및 유지되는 헤드부를 구비하여 사용자가 저온 유지되는 상기 헤드부를 피부에 접촉시켜 일정시간 마사지하는 경우 기미 축소 및 치료의 효과를 거둘 수 있게 한 것이다.

발명의 효과

이상에서 설명한 바와 같이, 본 발명에 따른 기미 치료용 피부 마사지기에 의하면, 헤드부 온도유지장치에 의해 소정의 저온상태로 온도 제어 및 유지되는 헤드부를 구비하여 사용자가 저온 유지되는 상기 헤드부를 피부에 접촉시켜 일정시간 마사지하는 경우 기미 축소 및 치료의 효과를 거둘 수 있게 구성됨으로써, 저렴한 비용으로 가정에서 누구나 손쉽게 이용할 수가 있고, 또한 어떠한 부작용 발생 없이 장기간 지속적으로 이용할 수 있는 장점을 제공하게 된다.

도면의 간단한 설명

도 1은 본 발명에 따른 피부 마사지기의 제1실시예를 도시한 사시도,

도 2는 도 1의 선 'A-A'를 따라 취한 단면도,

도 3은 도 1의 제1실시예에서 주요 구성요소를 도시한 블럭도,

도 4는 본 발명의 제1실시예에 채용되는 펠티에 모듈의 기본 개념을 설명하기 위한 도면,

도 5는 본 발명에 따른 피부 마사지기의 제2실시예를 도시한 사시도,

도 6은 도 5의 선 'B-B'를 따라 취한 단면도,

도 7은 도 5의 제2실시예에서 수냉장치 본체의 내부 구성을 도시한 개략도,

도 8은 도 5의 제2실시예에서 주요 구성요소를 도시한 블럭도.

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<도면의 주요 부분에 대한 부호의 설명>

100 : 마사지기 본체 101 : 손잡이부

102 : 온/오프 스위치 110 : 헤드부

106 : 통신 케이블 111 : 온도센서

120,160 : 헤드부 온도유지장치 121 : 펠티에 모듈

129 : 냉각팬 130 : 메인 컨트롤러

140 : 전원공급부 150 : 표시수단

161 : 수냉튜브

162a, 162b : 연결튜브 163 : 수냉장치 본체

164 : 저수탱크 167 : 소형펌프

168 : 보조 컨트롤러 170 : 냉각장치부

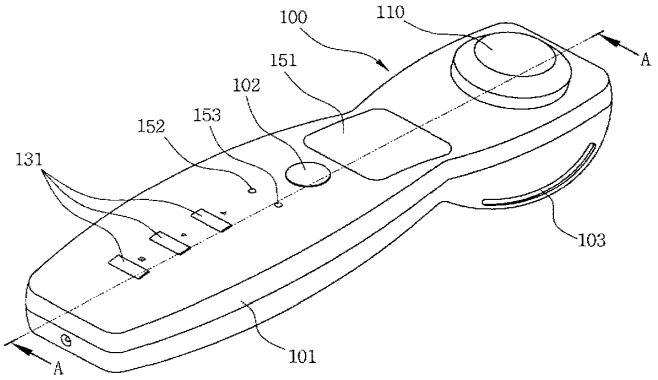
171 : 압축기 172 : 응축기

173 : 팽창밸브 174 : 냉각코일

175 : 히팅부 176 : 발열코일

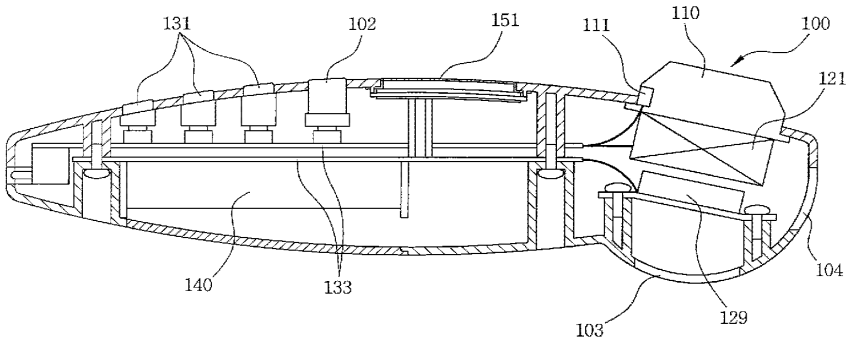
도면

도면1

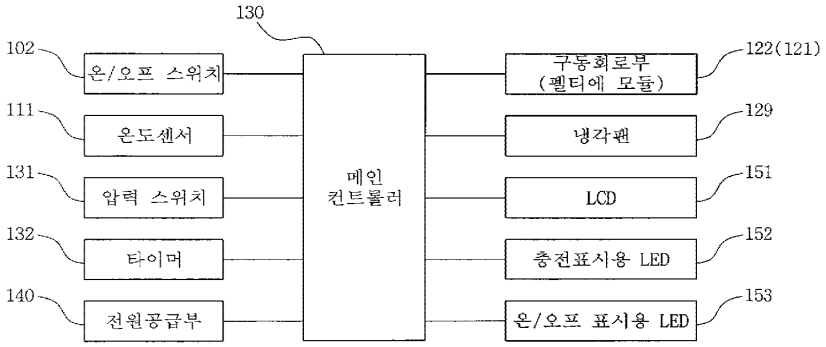


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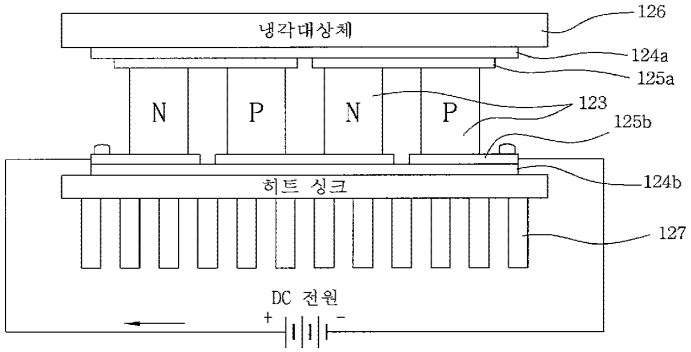
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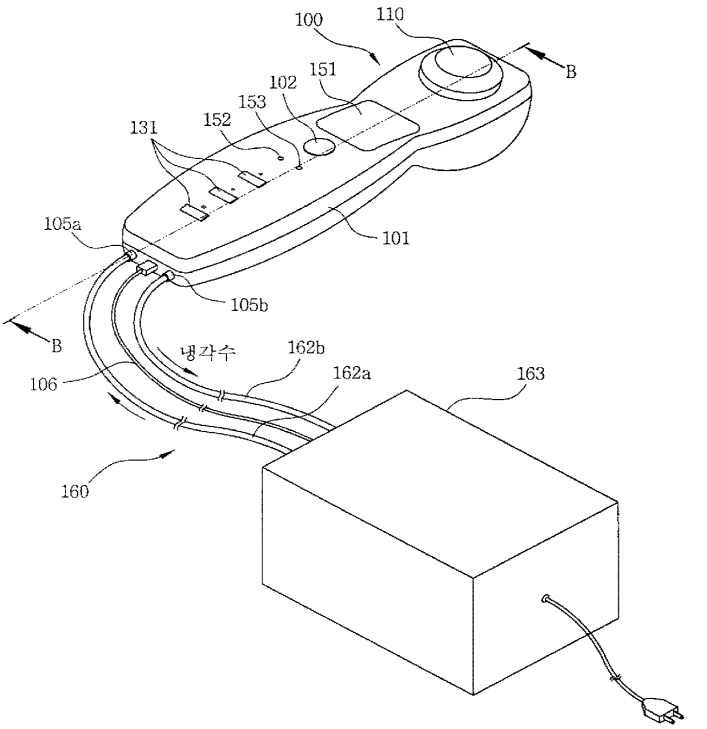


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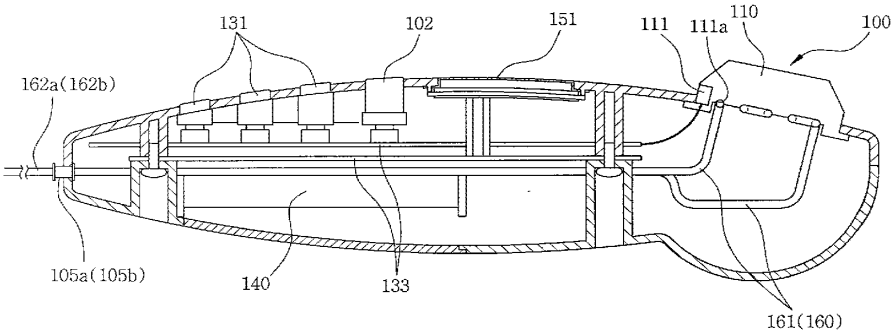


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도면5

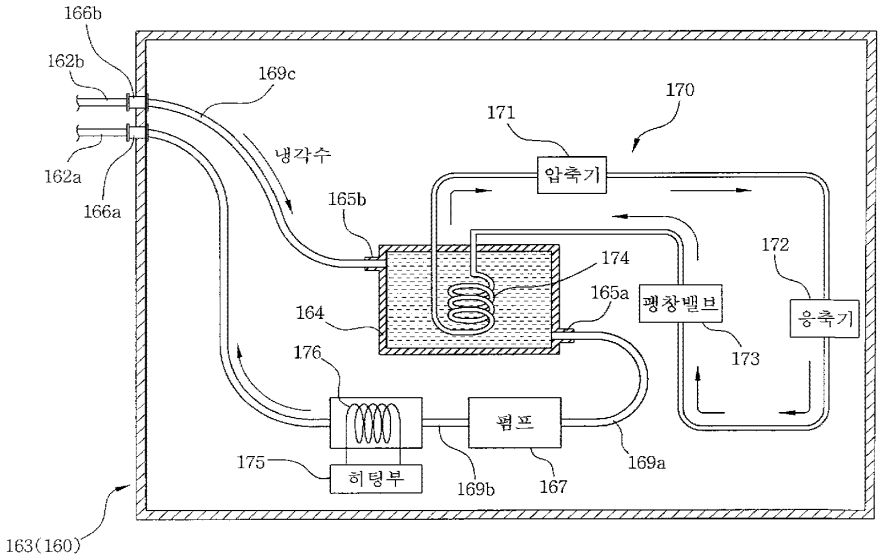


도면6

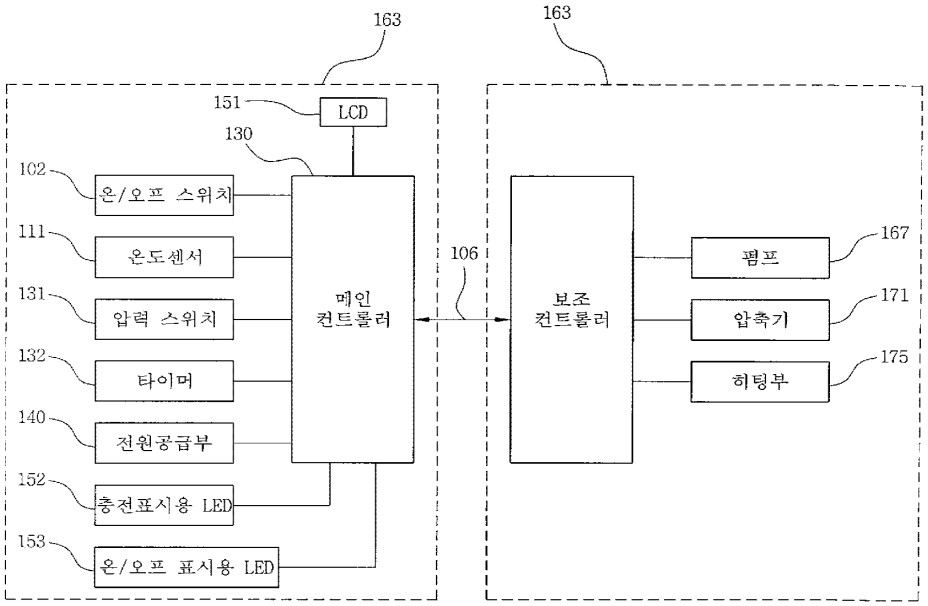


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도면7



도면8



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ABSTRACT KR101064115B1

The present invention provides a cupping-type low-frequency therapy combination heater that is made in the shape of a cupping machine and used by contacting the skin of the body, and has therapeutic functions other than cupping therapy, thereby improving the user's beauty and health. In the cupping-type low-frequency therapy combination heater according to the present invention, the inner wall 24 and the outer wall 25 are positioned at a distance from each other at the lower part of the body frame 20, which is shaped like a cupper, to form a first open passage 22 and a second open passage 22. As the open passage 23 is formed, heat treatment and cupping treatment are performed through the first open passage 22 and the second open passage 23, and low frequencies are applied on the second open passage 23 where the cupping treatment is performed. A discharge plate (61) or a discharge tube (68a) (68b) that emits radiation is installed to enable low-frequency treatment, so that heat therapy, cupping therapy, and low-frequency therapy can be performed simultaneously with a simple configuration. , low-frequency treatment is carried out simultaneously to maximize the treatment effect. The cupping-type low-frequency therapy combination heater (100) according to the present invention includes a body frame (20), a heating device (40), a low-frequency generating device (60), and an air pressure adjusting device (80). The body frame 20 has an internal space 21 formed in the vertical direction, and an inner wall 24 and an inner wall 24 surrounding the first open passage 22 in the shape of a hole formed at the bottom and communicating with the internal space 21.) and an outer wall 25 surrounding the second open passage 23 formed in a strip shape is formed. The heating device 40 is installed on the internal space 21 of the body frame 20 and the first open passage 22 to emit heat to the outside of the first open passage 22. The low-frequency generating mechanism 60 is provided with a discharge plate 61 or discharge pipes 68a and 68b installed on the second open passage 23 of the body frame 20, and emits a second signal through the discharge plate 61. Low frequencies are emitted to the outside of the open path 23. The air pressure control mechanism 80 is installed in communication with the second open passage 23 of the body frame 20 to control the air pressure of the second open passage 23. In the cupping-type low-frequency therapy combination heater 100 according to the present invention, the lower ends of the inner wall 24 and the outer wall 25 of the body frame 20 come into contact with the user's body through the first open passage 22. Thermal treatment using the heat emitted, low frequency treatment using the low frequency emitted through the second open channel 23, and cupping treatment due to the pressure drop in the second open channel 23 are performed simultaneously.

Cupping, low frequency, heat therapy, magnet, infrared, ultraviolet rays

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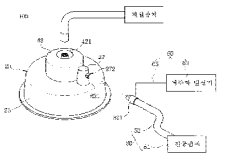
(54) 부항식 저주파치료 겸용 온열기

(57) 요 약

본 발명은 부항기 형상으로 이루어져 신체의 피부에 접촉시켜 사용하는 것으로, 부항치료 이외의 치료기능도 부가되도록 하여 사용자의 미용, 건강 증진을 도모하게 되는 부항식 저주파치료 겸용 온열기를 제공한다. 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기는 부항기 형상으로 이뤄진 몸체프레임(20)의 하부에 내벽(24)과 외벽(25)이 서로 이격되게 위치되어 제1개방로(22)와 제2개방로(23)가 형성되면서 제1개방로(22)와 제2개방로(23)를 통해 온열치료와 부항치료가 이루어지도록 하고, 부항치료가 이루어지는 제2개방로(23) 상에 저주파를 방출시키게 되는 방출판(61)이나 방출관체(68a)(68b)가 설치되어 저주파치료가 이루어지도록 하여 단순한 구성으로도 온열치료, 부항치료, 저주파치료가 동시에 이루어질 수 있도록 하고, 온열치료, 부항치료, 저주파치료가 동시에 이루어지면서 치료효과가 극대화되도록 한 것이다.

본 발명에 따른 부항식 저주파치료 겸용 온열기(100)는 몸체프레임(20), 온열기구(40), 저주파 발생기구(60), 공기압조절기구(80)를 포함한다. 몸체프레임(20)은 상하방향으로 내부공간(21)이 형성되고, 내부공간(21)과 연통되어 하부에 형성된 홀 형상의 제1개방로(22)를 둘러싸는 내벽(24)과 내벽(24)을 둘러싸며 띠 형상으로 형성된 제2개방로(23)를 둘러싸는 외벽(25)이 형성된다. 온열기구(40)는 몸체프레임(20)의 내부공간(21)과 제1개방로(22) 상에 설치되어 제1개방로(22)의 외부로 온열을 방출시키게 된다. 저주파 발생기구(60)는 몸체프레임(20)의 제2개방로(23) 상에 설치되는 방출판(61)이나 방출관체(68a)(68b)를 구비하여 방출판(61)을 통해 제2개방로(23)의 외부로 저주파를 방출시키게 된다. 공기압조절기구(80)는 몸체프레임(20)의 제2개방로(23)와 연통되게 설치되어 제2개방로(23)의 공기압을 조절하게 된다. 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기(100)는 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 제1개방로(22)를 통해 방출되는 온열에 의한 온열치료와, 제2개방로(23)를 통해 방출되는 저주파에 의한 저주파치료 및, 제2개방로(23)의 압력강하에 의한 부항치료가 동시에 수행되도록 한다.

대 표 도 - 도3



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특허청구의 범위

청구항 1

상하방향으로 내부공간(21)이 형성되고, 상기 내부공간(21)과 연통되어 하부에 형성된 홀 형상의 제1개방로(22)를 둘러싸는 내벽(24)과 상기 내벽(24)을 둘러싸며 띠 형상으로 형성된 제2개방로(23)를 둘러싸는 외벽(25)을 포함하는 몸체프레임(20)과;

상기 몸체프레임(20)의 내부공간(21)과 제1개방로(22) 상에 설치되어 상기 제1개방로(22)의 외부로 온열을 방출시키게 되는 온열기구(40)와;

상기 몸체프레임(20)의 제2개방로(23)와 연통되게 설치되어 상기 제2개방로(23)의 공기압을 조절하게 되는 공기압조절기구(80)를 포함하되,

상기 몸체프레임(20)의 제2개방로(23)로 노출되게 상기 몸체프레임(20)에 설치되어 상기 제2개방로(23)을 통해 외부로 저주파를 방출시키게 되는 저주파 발생기구(60)를 더 구비하여,

상기 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 상기 제1개방로(22)를 통해 방출되는 온열에 의한 온열치료와, 상기 제2개방로(23)를 통해 방출되는 저주파에 의한 저주파치료 및, 상기 제2개방로(23)의 압력 강하에 의한 부항치료가 동시에 수행되도록 하는 것을 특징으로 하는 부항식 저주파치료 겸용 온열기.

청구항 2

제 1항에 있어서,

상기 저주파 발생기구(60)는 하부가 상기 몸체프레임(20)의 외벽(25) 내주면을 이루어 상기 제2개방로(23)로 노출되고, 상부가 상기 몸체프레임(20)의 내부공간(21) 상단 내주면을 이루어 상기 내부공간(21)으로 노출되며, 상기 몸체프레임(20)의 형상에 따라 굴곡부를 가지는 중공형 관체로 이루어져 상기 몸체프레임(20)과 일체로 결합되는 제1방출관체(68a)와;

하부가 상기 몸체프레임(20)의 내벽(24) 외주면을 이루어 상기 제2개방로(23)로 노출되고, 상부가 상기 몸체프레임(20)의 내부공간(21) 상단 내주면을 이루어 상기 내부공간(21)으로 노출되되 상기 제1방출관체(68a)의 상부로부터 하측으로 이격되게 위치되며, 상기 몸체프레임(20)의 형상에 따라 굴곡부를 가지는 중공형 관체로 이루어져 상기 몸체프레임(20)과 일체로 결합되되 상기 제1방출관체(68a)과 분리되도록 하는 제2방출관체(68b)와;

상기 몸체프레임(20)의 내부공간(21) 상단에 끼움결합되어 상기 몸체프레임(20)의 내부공간(21)이 폐쇄되도록 하고, 하부에 상하방향으로 서로 이격된 한쌍의 접속단자(69a)(69b)가 형성되어 상기 제1방출관체(68a)의 상부와 제2방출관체(68b)의 상부에 각각 접속하게 되는 접속용 덮개(42) 및;

상기 접속용 덮개(42)와 전기적으로 접속하게 되고, 저주파를 발생시켜 상기 접속용 덮개(42)의 접속단자(69a)(69b)로 저주파를 전달하게 되는 저주파발생기(63)를 포함하여,

상기 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 상기 제2개방로(23)의 압력 강하에 의해 부항치료가 수행될 시 사용자의 신체가 상기 제2개방로(23)로 유입되면서 상기 제1방출관체(68a)와 제2방출관체(68b)와 접촉하여 저주파치료가 수행되도록 하는 것을 특징으로 하는 부항식 저주파치료 겸용 온열기.

청구항 3

제 1항에 있어서,

상기 제2개방로(23)와 연통되는 정해진 길이의 끼움홈(271)이 내부에 형성되고 상기 끼움홈(271)과 연통되는 통공(272)이 외주면에 형성된 돌출단(27)이 상기 몸체프레임(20)의 내벽(24)와 외벽(25)을 연결하여 상기 제2개방로(23)의 상부면을 이루게 되는 부위에 형성되도록 하되,

상기 저주파 발생기구(60)는 띠(band) 형상으로 이루어져 상기 제2개방로(23)에 삽입되고, 전도체로 이루어져 저주파를 상기 제2개방로(23)의 외부로 방출하게 되는 방출판(61)과;

상기 방출판(61)의 상부면에 상측으로 돌출되게 형성되어 상기 몸체프레임(20)의 돌출단(27)에 형성된 상기 끼

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움홈(271)에 삽입고정되고, 상기 돌출단(27)의 통공(272)과 연통되는 고정홈(621)이 외주면에 형성되며, 전도체로 이루어져 상기 방출판(61)과 전기적으로 접속하게 되는 접속단(62) 및;

상기 접속단(62)의 고정홈(621)과 접속되는 연결케이블(65)에 의해 상기 접속단(62)과 전기적으로 접속하게 되고, 저주파를 발생시켜 상기 방출판(61)으로 전달하게 되는 저주파발생기(63)를 포함하는 것을 특징으로 하는 부항식 저주파치료 겸용 온열기.

청구항 4

제 1항 내지 제 3항 중 어느 한 항에 있어서,

상기 몸체프레임(20)은 유연성을 가진 수지 소재가 사출성형되어 일체로 형성된 것과 상기 내벽(24)과 외벽(25)이 고무소재의 피복재에 의해 감싸지도록 하는 것 중에서 선택된 어느 하나인 것을 특징으로 하는 부항식 저주파 치료 겸용 온열기.

청구항 5

제 1항 내지 제 3항 중 어느 한 항에 있어서,

상기 몸체프레임(20)은 상기 내벽(24) 하단부에 장착홈(29)이 형성되어 상기 장착홈(29)에 자석체(30)가 삽입고정되도록 하여 상기 자석체(30)가 발생시키는 자력에 의한 자석치료가 수행되도록 하는 것을 특징으로 하는 부항식 저주파 치료 겸용 온열기.

청구항 6

제 1항 내지 제 3항 중 어느 한 항에 있어서,

상기 몸체프레임(20)은 상기 내부공간(21)과 제1개방로(22)가 연결되는 부위에 걸림턱(26)이 형성되도록 하여 상기 온열기구(40)가 상기 몸체프레임(20)의 개방된 상부를 통해 상기 내부공간(21)으로 삽입되면서 상기 걸림턱(26)에 걸림고정되도록 하되,

상기 온열기구(40)는 정해진 온도의 열을 발생시키게 되고, 외주면 둘레에 단턱(411)이 형성되어 상기 몸체프레임(20)의 걸림턱(26)에 걸림고정되면서 상기 내부공간(21)과 제1개방로(22) 상에 위치되는 히터(41) 및;

상기 몸체프레임(20)의 내부공간(21) 상단에 끼움결합되어 상기 몸체프레임(20)의 내부공간(21)이 폐쇄되도록 하고, 상부면에 전극단자(421)가 외부로 노출되게 형성되어 전원장치로부터 전원을 공급받게 되며, 상기 히터(41)와 전기적으로 접속되어 상기 히터(41)로 전원을 전달하게 되는 접속용 덮개(42)를 포함하는 것을 특징으로 하는 부항식 저주파 치료 겸용 온열기.

청구항 7

제 6항에 있어서,

상기 온열기구(40)는 상기 히터(41)의 상부면에 결합되어 상기 히터(41)에 의해 가열되면서 원적외선을 방출하게 되는 세라믹재질의 접촉판을 더 포함하는 것을 특징으로 하는 부항식 저주파치료 겸용 온열기.

청구항 8

제 3항에 있어서,

상기 저주파 발생기구(60)는 상기 방출판(61)이 삽입된 상기 몸체프레임(20)의 제2개방로(23)로 삽입되는 전달패드(64)를 더 구비하고,

상기 몸체프레임(20)은 상기 외벽(25) 하단부에 유연성이 있는 수지재질의 걸림단(28)이 내측으로 돌출되게 형성되어 상기 제2개방로(23)에 삽입된 상기 전달패드(64)가 상기 걸림단(28)에 의해 걸리면서 상기 제2개방로(23)에서 이탈되지 않도록 하되,

상기 전달패드(64)는 스펀지(sponge)를 포함하는 수지재질로 된 정해진 두께의 띠 형상으로 이루어져 상기 전달패드(64)의 상부는 상기 방출판(61)과 접촉하도록 하고, 상기 전달패드(64)의 하부는 신체와 접촉하도록 하여 상기 방출판(61)에서 방출되는 저주파가 상기 전달패드(64)를 통해 신체로 전달하게 되는 것을 특징으로 하는 부항식 저주파치료 겸용 온열기.

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청구항 9

제 3항에 있어서,

자외선과 적외선 중에서 선택된 어느 하나를 방출하게 되는 LED(66)가 더 구비되어,

상기 LED(66)가 상기 저주파 발생기구(60)의 방출판(61)에 형성된 결합홈(611)에 착탈식으로 고정되어 외부로 자외선과 적외선 중에서 선택된 어느 하나가 방출되도록 하는 것을 특징으로 하는 부항식 저주파치료 겸용 온열기.

청구항 10

제 3항에 있어서,

상기 공기압조절기구(80)는 상기 제2개방로(23) 내부의 공기를 흡입하게 되는 진공펌프(81)와;

상기 진공펌프(81)와 제2개방로(23) 사이에 설치되어 상기 진공펌프(81)와 제2개방로(23)를 서로 연결시키게 되고, 끝단부에 고정단(821)이 형성된 연결호스(82)를 포함하되,

상기 저주파 발생기구(60)의 접속단(62)은 상기 고정홈(621)과 연통되는 통로(622)가 내부에 형성되도록 하고, 상기 통로(622)의 하부에 외부로 개방되어 상기 제2개방로(23)와 연통되는 관통로(623)가 형성되도록 하여,

상기 연결호스(82)의 고정단(821)이 상기 접속단(62)의 고정홈(621)에 끼움결합되면서 상기 제2개방로(23)의 내부 공기가 상기 진공펌프(81)에 의해 흡입될 수 있도록 하는 것을 특징으로 하는 부항식 저주파치료 겸용 온열기.

명 세 서

발명의 상세한 설명

기 술 분 야

[0001] 본 발명은 부항식 저주파치료 겸용 온열기에 관한 것으로, 좀더 구체적으로는 부항기에 온열기구와 저주파 발생기구가 설치되는 구성이 단순화되도록 하여 단순한 구성으로도 온열치료, 부항치료, 저주파치료가 동시에 이루어질 수 있도록 한 부항식 저주파치료 겸용 온열기에 관한 것이다.

배 경 기 술

[0002] 일반적으로, 한방에서는 인체의 피부에 부압으로 부착하는 작은 용기를 이용한 부항 치료법이 널리 시행되고 있는데, 이 부항 치료법은 경혈 상의 피부에 부압을 작용시켜 비생리적 체액인 담음(痰飮)과 어혈(瘀血)을 제거하여 체액을 정화하는 요법으로 생리적으로는 신진대사를 원활하게 하고, 피의 정화를 수행하며, 모세혈관을 확장시켜 혈액순환을 돕고 영양소를 각 세포로 원활하게 공급하는 한편 노폐물이나 독소는 체외로 배출시키는 작용을 수행하게 된다.

[0003] 이와 같은 부항 치료를 수행하는 부항 치료기구와 관련하여 본 발명자는 대한민국 등록실용신안공보 등록번호 제20-0254568호 "한방의료보조용 부항쑥뜸기", 등록특허공보 등록번호 제10-0419721호 "한방의료보조용 부항쑥뜸기", 등록번호 제10-0562368호 "부항쑥뜸기 및 이를 사용한 부항쑥뜸 시스템" 등을 출원한 바 있다.

[0004] 상기와 같이 본 발명자에 의해 기출원된 부항쑥뜸기는 부항치료과 쑥뜸치료가 동시에 병행하여 실시되도록 하여 치료효과를 증대시킨 것인데, 부항기 내부에 쑥항아리를 거치하거나, 별도의 쑥연기형성기를 구비하여 부항기와 연통시키는 등의 쑥뜸치료를 위한 장치구성이 번거롭고 복잡하여 활용도가 떨어지는 문제점이 있었다.

[0005] 한편, 자외선이나 적외선, 고주파에 의한 방사열이나, 전열기에 의한 전도열을 이용한 온열요법이 현재 각 분야에서 치료효과를 높이기 위해 다양하게 활용되고 있는데, 이와 같은 온열요법은 신체에 대하여 혈액순환개선, 신진대사촉진, 통증완화 등의 작용을 수행함에 따라, 부항 치료법에도 적용되어 부항치료의 효과를 증대시키고 있다.

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[0006] 이와 같은 온열요법이 적용된 부항 치료기구와 관련하여 본 발명자는 대한민국 등록실용신안공보 등록번호 제20-0441718호 "부항식 온열장치", 특허출원번호 제10-2008-0032365호 "원적외선이 방출되는 부항기" 등을 출원한 바 있다.

[0007] 상기 "부항식 온열장치"는 인가되는 전원에 의해 온열을 발생시키도록 온열부가 구비된 부항식 온열장치에 있어서, 상기 온열부는, 하부 가장자리부에 홈 형태의 부항로가 형성되고, 중앙부에 상부와 연통되는 온열로가 형성된 하부케이스; 상기 하부케이스에 하부가 결합되고, 내부에 공간부가 형성된 상부케이스; 상기 온열로상에 배치되도록 상기 하부케이스상에 설치되고, 가열시에 근적외선 및 생체파장이 발산되는 온열판; 및 상기 온열판을 가열시키도록 그 상측에 설치되는 가열수단을 포함하는 것을 특징으로 한 것이다.

[0008] 그리고, 상기 "원적외선이 방출되는 부항기"는 내부에 상하로 통로가 형성된 원통체를 이루는 몸체부 측벽과; 상기 몸체부 측벽의 하부 둘레를 따라 상기 몸체부 측벽에서 외측으로 이격되게 형성되어 상기 몸체부 측벽과의 사이에 원형 띠 모양의 부항로가 형성되도록 하는 부항용 측벽과; 상기 통로에 설치되어 원적외선을 방출하는 온열장치와; 상기 통로의 정해진 높이에 설치되어 상기 통로의 상부가 밀폐되도록 하는 밀폐판과; 일단이 상기 부항로와 연통되고, 타단이 밀폐된 상기 통로의 상부와 연통되며, 밀폐된 상기 통로의 상부와 연결되는 진공펌프의 구동에 따라 상기 부항로의 공기압을 조절하게 되는 공기압조절관을 포함하되, 상기 몸체부 측벽의 하부와 상기 부항용 측벽은 세라믹 재질로 이루어져 상기 온열장치에 의해 가열되면 원적외선이 방출되도록 하는 것을 특징으로 한 것이다.

[0009] 상기와 같은 종래의 온열요법이 적용된 부항 치료기구는 부항기 형상으로 된 하나의 치료기구를 통해 온열요법과 부항치료가 병행 실시되는 장점을 가지고 있으며, 이와 더불어 온열요법과 효과와 부항치료의 효과를 동시에 증대시킬 수 있는 장점을 가지고 있는데, 이는 온열요법이나 부항치료 등을 개별적으로 수행할 시 따르는 치료비용 및 치료시간의 절감을 유도하므로, 상기와 같은 부항기 형상으로 된 하나의 치료기구에 다양한 치료효과가 동시에 구현될 수 있는 기술의 개발이 요구되고 있는 실정이라 하겠다.

발명의 내용

해결 하고자하는 과제

[0010] 따라서 본 발명은 이와 같은 기술개발의 문제점을 개선하여, 부항기 형상으로 이뤄진 몸체프레임의 하부에 내벽과 외벽이 서로 이격되게 위치되어 제1개방로와 제2개방로가 형성되면서 제1개방로와 제2개방로를 통해 온열치료와 부항치료가 이루어지도록 하고, 부항치료가 이루어지는 제2개방로 상에 저주파를 방출시키게 되는 방출판이나 방출관체가 설치되어 저주파치료가 이루어지도록 하여 단순한 구성으로도 온열치료, 부항치료, 저주파치료가 동시에 이루어질 수 있는 새로운 형태의 부항식 저주파치료 겸용 온열기를 제공하는 것을 목적으로 한다.

과제 해결수단

[0011] 상술한 목적을 달성하기 위한 본 발명의 특징에 의하면, 본 발명은 상하방향으로 내부공간(21)이 형성되고, 상기 내부공간(21)과 연통되어 하부에 형성된 홀 형상의 제1개방로(22)를 둘러싸는 내벽(24)과 상기 내벽(24)을 둘러싸며 띠 형상으로 형성된 제2개방로(23)를 둘러싸는 외벽(25)을 포함하는 몸체프레임(20)과; 상기 몸체프레임(20)의 내부공간(21)과 제1개방로(22) 상에 설치되어 상기 제1개방로(22)의 외부로 온열을 방출시키게 되는 온열기구(40)와; 상기 몸체프레임(20)의 제2개방로(23)와 연통되게 설치되어 상기 제2개방로(23)의 공기압을 조절하게 되는 공기압조절기구(80)를 포함하되, 상기 몸체프레임(20)의 제2개방로(23)로 노출되게 상기 몸체프레임(20)에 설치되어 상기 제2개방로(23)을 통해 외부로 저주파를 방출시키게 되는 저주파 발생기구(60)를 더 구비하여, 상기 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 상기 제1개방로(22)를 통해 방출되는 온열에 의한 온열치료와, 상기 제2개방로(23)를 통해 방출되는 저주파에 의한 저주파치료 및, 상기 제2개방로(23)의 압력 강하에 의한 부항치료가 동시에 수행되도록 하는 것을 특징으로 한다.

[0012] 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기에서 상기 저주파 발생기구(60)는 하부가 상기 몸체프

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레임(20)의 외벽(25) 내주면을 이루어 상기 제2개방로(23)로 노출되고, 상부가 상기 몸체프레임(20)의 내부공간(21) 상단 내주면을 이루어 상기 내부공간(21)으로 노출되며, 상기 몸체프레임(20)의 형상에 따라 굴곡부를 가지는 중공형 관체로 이루어져 상기 몸체프레임(20)과 일체로 결합되는 제1방출관체(68a)와; 하부가 상기 몸체프레임(20)의 내벽(24) 외주면을 이루어 상기 제2개방로(23)로 노출되고, 상부가 상기 몸체프레임(20)의 내부공간(21) 상단 내주면을 이루어 상기 내부공간(21)으로 노출되되 상기 제1방출관체(68a)의 상부로부터 하측으로 이격되게 위치되며, 상기 몸체프레임(20)의 형상에 따라 굴곡부를 가지는 중공형 관체로 이루어져 상기 몸체프레임(20)과 일체로 결합되되 상기 제1방출관체(68a)과 분리되도록 하는 제2방출관체(68b)와; 상기 몸체프레임(20)의 내부공간(21) 상단에 끼움결합되어 상기 몸체프레임(20)의 내부공간(21)이 폐쇄되도록 하고, 하부에 상하방향으로 서로 이격된 한쌍의 접속단자(69a)(69b)가 형성되어 상기 제1방출관체(68a)의 상부와 제2방출관체(68b)의 상부에 각각 접속하게 되는 접속용 덮개(42) 및; 상기 접속용 덮개(42)와 전기적으로 접속하게 되고, 저주파를 발생시켜 상기 접속용 덮개(42)의 접속단자(69a)(69b)로 저주파를 전달하게 되는 저주파발생기(63)를 포함하여, 상기 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 상기 제2개방로(23)의 압력 강하에 의해 부항치료가 수행될 시 사용자의 신체가 상기 제2개방로(23)로 유입되면서 상기 제1방출관체(68a)와 제2방출관체(68b)와 접촉하여 저주파치료가 수행되도록 하는 구성으로 이루어질 수 있다.

[0013] 이와 달리, 상기 제2개방로(23)와 연통되는 정해진 길이의 끼움홈(271)이 내부에 형성되고 상기 끼움홈(271)과 연통되는 통공(272)이 외주면에 형성된 돌출단(27)이 상기 몸체프레임(20)의 내벽(24)와 외벽(25)을 연결하여 상기 제2개방로(23)의 상부면을 이루게 되는 부위에 형성되도록 하되, 상기 저주파 발생기구(60)는 띠(band) 형상으로 이루어져 상기 제2개방로(23)에 삽입되고, 전도체로 이루어져 저주파를 상기 제2개방로(23)의 외부로 방출하게 되는 방출판(61)과; 상기 방출판(61)의 상부면에 상측으로 돌출되게 형성되어 상기 몸체프레임(20)의 돌출단(27)에 형성된 상기 끼움홈(271)에 삽입고정되고, 상기 돌출단(27)의 통공(272)과 연통되는 고정홈(621)이 외주면에 형성되며, 전도체로 이루어져 상기 방출판(61)과 전기적으로 접속하게 되는 접속단(62) 및; 상기 접속단(62)의 고정홈(621)과 접속되는 연결케이블(65)에 의해 상기 접속단(62)과 전기적으로 접속하게 되고, 저주파를 발생시켜 상기 방출판(61)으로 전달하게 되는 저주파발생기(63)를 포함하는 구성으로도 이루어질 수 있는데, 이와 같은 구성의 저주파 발생기구(60)는 상기 방출판(61)이 삽입된 상기 몸체프레임(20)의 제2개방로(23)로 삽입되는 전달패드(64)를 더 구비하고, 상기 몸체프레임(20)은 상기 외벽(25) 하단부에 유연성이 있는 수지재질의 걸림단(28)이 내측으로 돌출되게 형성되어 상기 제2개방로(23)에 삽입된 상기 전달패드(64)가 상기 걸림단(28)에 의해 걸리면서 상기 제2개방로(23)에서 이탈되지 않도록 하되, 상기 전달패드(64)는 스펀지(sponge)를 포함하는 수지재질로 된 정해진 두께의 띠 형상으로 이루어져 상기 전달패드(64)의 상부는 상기 방출판(61)과 접촉하도록 하고, 상기 전달패드(64)의 하부는 신체와 접촉하도록 하여 상기 방출판(61)에서 방출되는 저주파가 상기 전달패드(64)를 통해 신체로 전달하게 할 수 있다. 또한, 이와 같은 구성의 저주파 발생기구(60)는 자외선과 적외선 중에서 선택된 어느 하나를 방출하게 되는 LED(66)가 더 구비되어, 상기 LED(66)가 상기 저주파 발생기구(60)의 방출판(61)에 형성된 결합홈(611)에 착탈식으로 고정되어 외부로 자외선과 적외선 중에서 선택된 어느 하나가 방출되도록 할 수 있다. 그리고, 이와 같은 구성의 저주파 발생기구(60)를 가지는 본 발명에 따른 부항식 저주파치료 겸용 온열기에서 상기 공기압조절기구(80)는 상기 제2개방로(23) 내부의 공기를 흡입하게 되는 진공펌프(81)와; 상기 진공펌프(81)와 제2개방로(23) 사이에 설치되어 상기 진공펌프(81)와 제2개방로(23)를 서로 연결시키게 되고, 끝단부에 고정단(821)이 형성된 연결호스(82)를 포함하되, 상기 저주파 발생기구(60)의 접속단(62)은 상기 고정홈(621)과 연통되는 통로(622)가 내부에 형성되도록 하고, 상기 통로(622)의 하부에 외부로 개방되어 상기 제2개방로(23)와 연통되는 관통로(623)가 형성되도록 하여, 상기 연결호스(82)의 고정단(821)이 상기 접속단(62)의 고정홈(621)에 끼움결합되면서 상기 제2개방로(23)의 내부 공기가 상기 진공펌프(81)에 의해 흡입될 수 있도록 할 수 있다.

[0014] 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기에서 상기 몸체프레임(20)은 유연성을 가진 수지 소재가 사출성형되어 일체로 형성된 것과 상기 내벽(24)과 외벽(25)이 고무소재의 피복재에 의해 감싸지도록 하는 것 중에서 선택된 어느 하나인 것을 특징으로 한다.

[0015] 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기에서 상기 몸체프레임(20)은 상기 내벽(24) 하단부에 장착홈(29)이 형성되어 상기 장착홈(29)에 자석체(30)가 삽입고정되도록 하여 상기 자석체(30)가 발생시키는 자

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력에 의한 자석치료가 수행되도록 하는 것을 특징으로 한다.

[0016] 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기에서 상기 몸체프레임(20)은 상기 내부공간(21)과 제1개방로(22)가 연결되는 부위에 걸림턱(26)이 형성되도록 하여 상기 온열기구(40)가 상기 몸체프레임(20)의 개방된 상부를 통해 상기 내부공간(21)으로 삽입되면서 상기 걸림턱(26)에 걸림고정되도록 하되, 상기 온열기구(40)는 정해진 온도의 열을 발생시키게 되고, 외주면 둘레에 단턱(411)이 형성되어 상기 몸체프레임(20)의 걸림턱(26)에 걸림고정되면서 상기 내부공간(21)과 제1개방로(22) 상에 위치되는 히터(41) 및; 상기 몸체프레임(20)의 내부공간(21) 상단에 끼움결합되어 상기 몸체프레임(20)의 내부공간(21)이 폐쇄되도록 하고, 상부면에 전극단자(421)가 외부로 노출되게 형성되어 전원장치로부터 전원을 공급받게 되며, 상기 히터(41)와 전기적으로 접속되어 상기 히터(41)로 전원을 전달하게 되는 접속용 덮개(42)를 포함하는 것을 특징으로 한다.

[0017] 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기에서 상기 온열기구(40)는 상기 히터(41)의 상부면에 결합되어 상기 히터(41)에 의해 가열되면서 원적외선을 방출하게 되는 세라믹재질의 접촉판을 더 포함하는 것을 특징으로 한다.

효 과

[0018] 본 발명에 의한 부항식 저주파치료 겸용 온열기에 의하면, 부항기에 온열기구와 저주파 발생기구가 설치되는 구성이 단순화되어 단순한 구성으로도 온열치료, 부항치료, 저주파치료가 동시에 이루어져, 온열치료, 부항치료, 저주파치료를 개별적으로 수행하는 경우에 비하여 치료시간 및 치료비용이 절감되는 효과를 가지게 된다.

[0019] 또한, 온열치료, 부항치료, 저주파치료가 동시에 이루어지면서 각각의 기능이 서로 연동되면서 신체에 대한 치료효과가 극대화된다.

발명의 실시를 위한 구체적인 내용

[0020] 본 발명에 따른 부항식 저주파치료 겸용 온열기(100)는 부항기 형상으로 이루어져 신체의 피부에 접촉시켜 사용하는 것으로, 부항치료 이외의 치료기능도 부가되도록 하여 사용자의 미용, 건강 증진을 도모하게 되는 것이다.

[0021] 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기(100)는 부항기 형상으로 이뤄진 몸체프레임(20)의 하부에 내벽(24)과 외벽(25)이 서로 이격되게 위치되어 제1개방로(22)와 제2개방로(23)가 형성되면서 제1개방로(22)와 제2개방로(23)를 통해 온열치료와 부항치료가 이루어지도록 하고, 부항치료가 이루어지는 제2개방로(23) 상에 저주파를 방출시키게 되는 방출판(61)이나 방출관체(68a)(68b)가 설치되어 저주파치료가 이루어지도록 하여 단순한 구성으로도 온열치료, 부항치료, 저주파치료가 동시에 이루어질 수 있도록 한 것을 기술적 특징으로 한다.

[0022] 본 발명에 따른 부항식 저주파치료 겸용 온열기(100)는 몸체프레임(20), 공기압조절기구(80), 온열기구(40), 저주파 발생기구(60)를 포함한다.

[0023] 몸체프레임(20)은 온열치료가 이루어지는 제1개방로(22)와, 저주파치료와 부항치료가 이루어지는 제2개방로(23)가 하부에 형성되는데, 이와 같은 몸체프레임(20)은 상하방향으로 형성된 내부공간(21)과 연통되게 홀 형상의 제1개방로(22)가 형성되고, 제1개방로(22)의 외측 둘레를 따라 띠 형상으로 제2개방로(23)가 형성된다.

[0024] 또한, 몸체프레임(20)에는 제1개방로(22)를 둘러싸며 내벽(24)이 형성되는 한편, 내벽(24)을 둘러싸며 띠 형상으로 형성된 제2개방로(23)를 둘러싸며 외벽(25)이 형성된다.

[0025] 이와 같은 몸체프레임(20)은 고무, 합성수지와 같은 유연성을 가진 수지 소재가 사출성형되어 몸체프레임(20)의 전체부위가 일체로 형성되도록 하는 것이 바람직한데, 이는 몸체프레임(20)이 신체에 안정되게 밀착될 수 있도

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록 하여 부항치료의 효과를 증대시키는 한편, 사용자에 의한 몸체프레임(20)의 조작성을 증대시키게 된다.

[0026] 이와 달리, 몸체프레임(20)의 내벽(24)과 외벽(25)을 고무소재의 피복재로 감싸거나 코팅하여 몸체프레임(20)이 신체에 안정되게 밀착될 수 있도록 할 수도 있다.

[0027] 온열기구(40)는 몸체프레임(20)의 내부공간(21)과 제1개방로(22) 상에 설치되는 것으로, 이와 같은 온열기구(40)는 히터(41)를 구비하여 제1개방로(22)의 외부로 온열을 방출시키면서 온열치료가 이루어질 수 있도록 한다.

[0028] 여기서, 온열기구(40)는 히터(41)의 상부면에 결합되어 히터(41)에 의해 가열되면서 원적외선을 방출하게 되는 세라믹재질의 접촉판을 포함하여 원적외선에 의해 치료효과도 부가될 수 있도록 할 수 있다.

[0029] 저주파 발생기구(60)는 몸체프레임(20)의 제2개방로(23) 상에 설치되는 방출판(61)을 구비하게 되는 것으로, 이와 같은 저주파 발생기구(60)는 방출판(61)이나 방출관체(68a)(68b)를 통해 제2개방로(23)의 외부로 저주파를 방출시킴으로써 저주파치료가 이루어질 수 있도록 한다.

[0030] 공기압조절기구(80)는 몸체프레임(20)의 제2개방로(23)와 연통되게 설치되는 것으로, 이와 같은 공기압조절기구(80)는 제2개방로(23) 내부의 공기를 흡입하여 제2개방로(23)의 공기압을 조절하게 된다. 이에 따라 내벽(24)의 하단부와 외벽(25)의 하단부가 밀착되는 신체가 내벽(24)와 외벽(25) 사이에 위치되는 제2개방로(23)의 압력 강화에 의해 부항치료될 수 있도록 한다.

[0031] 이와 같은 본 발명에 따른 부항식 저주파치료 겸용 온열기(100)는 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 제1개방로(22)를 통해 방출되는 온열에 의한 온열치료와, 제2개방로(23)를 통해 방출되는 저주파에 의한 저주파치료 및, 제2개방로(23)의 압력 강하에 의한 부항치료가 동시에 수행될 수 있게 된다.

[0032] 이하, 본 발명의 실시예를 첨부된 도면 도 1 내지 도 7에 의거하여 상세히 설명한다. 한편, 도면과 상세한 설명에서 일반적인 부항식나 저주파치료기, 온열기로부터 이 분야의 종사자들이 용이하게 알 수 있는 구성 및 작용에 대한 도시 및 언급은 간략히 하거나 생략하였다. 특히 도면의 도시 및 상세한 설명에 있어서 본 발명의 기술적 특징과 직접적으로 연관되지 않는 요소의 구체적인 기술적 구성 및 작용에 대한 상세한 설명 및 도시는 생략하고, 본 발명과 관련되는 기술적 구성만을 간략하게 도시하거나 설명하였다.

[0033] 도 1은 본 발명의 제1실시예에 따른 부항식 저주파치료 겸용 온열기의 분리 단면도이고, 도 2는 본 발명의 제1실시예에 따른 부항식 저주파치료 겸용 온열기의 결합 단면도이며, 도 3은 본 발명의 제2실시예에 따른 부항식 저주파치료 겸용 온열기의 외형도이고, 도 4의 (a) 내지 (d)는 본 발명의 제2실시예에 따른 부항식 저주파치료 겸용 온열기가 조립되는 과정을 보여주기 위한 도면이며, 도 5은 본 발명의 제2실시예에 따른 부항식 저주파치료 겸용 온열기를 이루는 공기압조절기구의 구성을 보여주기 위한 도면이고, 도 6의 (a)와 (b)는 본 발명의 제3실시예에 따른 부항식 저주파치료 겸용 온열기를 보여주기 위한 도면이며, 도 7의 (a) 내지 (c)는 본 발명의 제4실시예에 따른 부항식 저주파치료 겸용 온열기가 조립되는 과정을 보여주기 위한 도면이다.

[0034] 본 발명에 따른 부항식 저주파치료 겸용 온열기는 도 1에서와 같이 몸체프레임(20), 온열기구(40), 저주파 발생기구(60), 공기압조절기구(80)를 포함하여 이루어진다.

[0035] 몸체프레임(20)은 유연성을 가진 수지 소재가 사출성형되어 전체 부위가 일체로 형성된 것으로, 몸체프레임(20)의 상부에는 상하방향으로 내부공간(21)이 형성되고, 몸체프레임(20)의 하부에는 내부공간(21)과 연통되는 홀

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형상으로 이루어져 온열치료가 이루어지게 되는 제1개방로(22)와 제1개방로(22)의 외측 둘레를 따라 띠 형상으로 이루어져 저주파치료 및 부항치료가 이루어지게 되는 제2개방로(23)가 형성된다. 여기서, 제1개방로(22)는 내벽(24)이 둘러싸게 되고, 제2개방로(23)는 외벽(25)이 둘러싸게 된다.

[0036] 본 발명에 따른 몸체프레임(20)은 도 4의 (a)에서와 같이 내부공간(21)과 제1개방로(22)가 연결되는 부위에 걸림턱(26)이 형성되어 온열기구(40)를 이루는 히터(41)가 몸체프레임(20)의 개방된 상부를 통해 내부공간(21)으로 삽입되면서 걸림턱(26)에 걸림고정될 수 있도록 한다.

[0037] 또한, 몸체프레임(20)은 몸체프레임(20)의 내벽(24)와 외벽(25)을 연결하여 상기 제2개방로(23)의 상부면을 이루게 되는 부위에 돌출단(27)이 형성되도록 하는데, 이와 같은 돌출단(27)의 내부에는 도 4의 (a) 내지 (c)에서와 같이 제2개방로(23)와 연통되는 정해진 길이의 끼움홈(271)이 형성되고, 돌출단(27)의 외주면에는 끼움홈(271)과 연통되는 통공(272)이 형성된다.

[0038] 그리고, 몸체프레임(20)은 외벽(25) 하단부에 유연성이 있는 수지재질의 걸림단(28)이 내측으로 돌출되게 형성되도록 한다.

[0039] 한편, 본 발명의 제2실시예에 따른 몸체프레임(20)은 내벽(24) 하단부 둘레를 따라 다수개의 장착홈(29)이 정해진 간격으로 형성되도록 하는데, 이와 같이 형성되는 장착홈(29)에 자석체(30)가 삽입고정되도록 하여 자석체(30)가 발생시키는 자력에 의한 자석치료가 수행될 수 있도록 한다.

[0040] 온열기구(40)는 몸체프레임(20)의 내부공간(21)과 제1개방로(22) 상에 설치되는 것으로, 본 발명에 따른 온열기구(40)는 도 4의 (a)에서와 같이 히터(41)와 접속용 덮개(42)를 포함하게 된다.

[0041] 히터(41)는 정해진 온도의 열을 발생시키게 되는 것으로, 히터(41)의 외주면 둘레에는 단턱(411)이 형성되어 히터(41)가 몸체프레임(20)의 내부공간(21) 상측으로 삽입되면 몸체프레임(20)에 형성된 걸림턱(26)에 걸림고정되면서 내부공간(21)과 제1개방로(22) 상에 위치하게 된다.

[0042] 접속용 덮개(42)는 몸체프레임(20)의 내부공간(21) 상단에 끼움결합되어 몸체프레임(20)의 내부공간(21)이 폐쇄되도록 하는 것으로, 이와 같은 접속용 덮개(42)는 상부면에 전극단자(421)가 외부로 노출되게 형성되어 전원장치로부터 전원을 공급받게 되고, 히터(41)와 전기적으로 접속되어 히터(41)로 전원을 전달하게 된다.

[0043] 저주파 발생기구(60)는 몸체프레임(20)의 제2개방로(23) 상에 설치되는 외부로 저주파를 방출하게 되는 것으로, 다양한 구성의 것이 사용될 수 있는데, 본 발명의 제1실시예에 따른 부항식 저주파치료 겸용 온열기(100)의 저주파 발생기구(60)는 도 1과 도 2에 도시되어 있고, 본 발명의 제2실시예에 따른 부항식 저주파치료 겸용 온열기(100)의 저주파 발생기구(60)는 도 2과 도 3에 도시되어 있다,

[0044] 여기서, 본 발명의 제1실시예에 따른 부항식 저주파치료 겸용 온열기(100)의 저주파 발생기구(60)는 도 1과 도 2에 도시된 바와 같이 제1방출관체(68a), 제2방출관체(68b), 접속용 덮개(42), 저주파발생기(63)로 이루어진다.

[0045] 제1방출관체(68a)는 몸체프레임(20)의 형상에 따라 굴곡부를 가지는 중공형 관체로 이루어져 몸체프레임(20)과 일체로 결합되는 것으로, 몸체프레임(20)이 유연성을 가진 수지 소재가 사출성형되어 이루어질 경우 몸체프레임(20)과 제1방출관체(68a)는 인서트 사출성형에 의해 일체로 성형될 수 있다.

[0046] 여기서, 제1방출관체(68a)는 도전성 소재로 이루어져 전기적으로 전달되는 저주파가 인가될 수 있도록 한다.

[0047] 이와 같은 제1방출관체(68a)의 하부는 몸체프레임(20)의 외벽(25) 내주면을 이루어 제2개방로(23)로 노출되어 사용자의 신체와 접촉하게 되고, 제1방출관체(68a)의 상부는 몸체프레임(20)의 내부공간(21) 상단 내주면을 이루어 내부공간(21)으로 노출되어 접속용 덮개(42)의 접속단자(69a)와 접속하게 된다.

[0048] 제2방출관체(68b)는 제1방출관체(68a)과 분리되어 몸체프레임(20)에 형성되는 것으로, 제2방출관체(68b)도 제1방출관체(68a)와 마찬가지로 몸체프레임(20)의 형상에 따라 굴곡부를 가지는 중공형 관체로 이루어져 몸체프레임(20)과 일체로 결합되고, 몸체프레임(20)이 유연성을 가진 수지 소재가 사출성형되어 이루어질 경우 몸체프레임(20)과 제2방출관체(68b)는 인서트 사출성형에 의해 일체로 성형될 수 있다. 또한, 제2방출관체(68b)도 도전성 소재로 이루어져 전기적으로 전달되는 저주파가 인가될 수 있도록 한다.

[0049] 이와 같은 제2방출관체(68b)의 하부는 몸체프레임(20)의 내벽(24) 외주면을 이루어 제2개방로(23)로 노출되어

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사용자의 신체와 접촉하게 되고, 제2방출관체(68b)의 상부는 몸체프레임(20)의 내부공간(21) 상단 내주면을 이루어 내부공간(21)으로 노출되어 접속용 덮개(42)의 접속단자(69b)와 접속하게 된다.

[0050] 여기서, 제2방출관체(68b)의 상부는 제1방출관체(68a)의 상부로부터 하측으로 이격되게 위치되어 제1방출관체(68a)와 제2방출관체(68b)가 서로 쇼트되지 않도록 한다.

[0051] 접속용 덮개(42)는 몸체프레임(20)의 내부공간(21) 상단에 끼움결합되어 몸체프레임(20)의 내부공간(21)이 폐쇄되도록 하는 것으로, 이와 같은 접속용 덮개(42)는 하부에 상하방향으로 서로 이격된 한쌍의 접속단자(69a)(69b)가 형성되어 제1방출관체(68a)의 상부와 제2방출관체(68b)의 상부에 각각 접속하게 된다.

[0052] 저주파발생기(63)는 접속용 덮개(42)와 전기적으로 접속하게 되는 것으로, 이와 같은 저주파발생기(63)는 저주파를 발생시켜 접속용 덮개(42)의 접속단자(69a)(69b)로 저주파를 전달함으로써 제1방출관체(68a)와 제2방출관체(68b)를 통해 저주파가 제2개방로(23)의 외부로 방출될 수 있도록 한다.

[0053] 본 발명의 제1실시예에 따른 부항식 저주파치료 겸용 온열기(100)의 저주파 발생기구(60)는 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 제2개방로(23)의 압력 강하에 의해 부항치료가 수행될 시 사용자의 신체가 제2개방로(23)로 유입되면서 제1방출관체(68a)와 제2방출관체(68b)와 접촉하여 저주파치료가 수행되도록 한다.

[0054] 한편, 본 발명의 제2실시예에 따른 저주파 발생기구(60)는 도 3과 도 4의 (a)에서와 같이 방출판(61), 접속단(62), 저주파발생기(63), 전달패드(64)를 포함한다.

[0055] 방출판(61)은 띠(band) 형상으로 이루어져 제2개방로(23)에 삽입되는 것으로, 전도체로 이루어져 저주파를 외부로 방출하게 된다.

[0056] 접속단(62)은 방출판(61)의 상부면에 상측으로 돌출되게 형성되어 몸체프레임(20)의 돌출단(27)에 형성된 끼움홈(271)에 삽입고정되는 것으로, 몸체프레임(20)의 돌출단(27)에 형성된 통공(272)과 연통되는 고정홈(621)이 외주면에 형성되어 저주파발생기(63)와 연결되는 연결케이블(65)이 고정될 수 있도록 한다. 이와 같은 접속단(62)은 전도체로 이루어져 방출판(61)과 전기적으로 접속하게 된다.

[0057] 저주파발생기(63)는 접속단(62)과 접속되는 연결케이블(65)에 의해 접속단(62)과 전기적으로 접속하게 되고, 저주파를 발생시켜 연결케이블(65) 및 접속단(62)을 통해 방출판(61)으로 전달하게 된다.

[0058] 전달패드(64)는 방출판(61)이 삽입된 몸체프레임(20)의 제2개방로(23)로 삽입되는 것으로, 상기와 같이 제2개방로(23)로 삽입된 전달패드(64)는 몸체프레임(20)의 외벽(25) 하단부에 형성된 걸림단(28)에 의해 걸리면서 제2개방로(23)에서 이탈되지 않게 된다. 이와 같은 전달패드(64)는 스펀지(sponge)를 포함하는 수지재질로 된 정해진 두께의 띠 형상으로 이루어짐에 따라, 전달패드(64)의 상부는 방출판(61)과 접촉하게 되고, 전달패드(64)의 하부는 신체와 접촉하게 되어 방출판(61)에서 방출되는 저주파가 전달패드(64)를 통해 안정되고 효과적으로 신체로 전달되게 된다. 여기서, 전달패드(64)는 사용전에 물을 듣혀 수분을 머금은 상태에서 사용되도록 한다.

[0059] 이와 달리, 도 6의 (a)와 (b)에서와 같이 본 발명의 제3실시예에 따른 부항식 저주파치료 겸용 온열기(100)에서는 별도의 저주파전달용 스프링(67)을 구비하고, 방출판(61)의 저면에는 요홈(612)을 형성하여 저주파전달용 스프링(67)이 방출판(61)의 요홈(612)에 끼움결합되도록 하는데, 이와 같은 저주파전달용 스프링(67)은 신체의 피부에 접촉하게 되면서 방출판(61)으로부터 저주파를 전달하게 된다. 그리고, 상기와 같이 저주파전달용 스프링(67)에 의해 저주파를 신체의 피부에 전달될 경우에는 얇은 두께의 패드를 신체의 피부에 부착시키거나, 로션을 신체의 피부에 바르게 된다.

[0060] 한편, 본 발명의 제4실시예에 따른 부항식 저주파치료 겸용 온열기(100)는 도 7의 (a) 내지 (c)에서와 같이 자외선이나 적외선을 방출하게 되는 LED(66)를 구비하고, 저주파 발생기구(60)의 방출판(61)에 결합홈(611)을 형성하여 LED(66)가 방출판(61)의 결합홈(611)에 착탈식으로 고정되도록 하는데, 이와 같은 본 발명의 제4실시예에 따른 부항식 저주파치료 겸용 온열기(100)는 방출판(61)의 결합홈(611)에 고정된 LED(66)에 의해 외부로 자외선나 적외선이 방출됨에 따라 부항식 저주파치료 겸용 온열기(100)의 치료효과를 증대시키게 된다.

[0061] 한편, 본 발명의 제2실시예에 따른 저주파 발생기구(60)의 접속단(62)은 고정홈(621)과 연통되는 통로(622)가 내부에 형성되도록 하고, 통로(622)의 하부에는 외부로 개방되어 제2개방로(23)와 연통되는 관통로(623)가 형성되도록 하여 접속단(62)에 공기압조절기구(80)가 접속하면서 제2개방로(23)의 공기를 흡입할 수 있도록 하고 있

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다.

[0062] 공기압조절기구(80)는 몸체프레임(20)의 제2개방로(23)와 연통되게 설치되는 것으로, 이와 같은 공기압조절기구(80)는 제2개방로(23) 내부의 공기를 흡입하여 제2개방로(23)의 공기압을 조절하게 된다. 이에 따라 내벽(24)의 하단부와 외벽(25)의 하단부가 밀착되는 신체가 내벽(24)와 외벽(25) 사이에 위치되는 제2개방로(23)의 압력 강화에 의해 부항치료될 수 있도록 한다.

[0063] 여기서, 본 발명의 실시예에 따른 공기압조절기구(80)는 제2개방로(23) 내부의 공기를 흡입하게 되는 진공펌프(81)와, 진공펌프(81)와 제2개방로(23) 사이에 설치되어 진공펌프(81)와 제2개방로(23)를 서로 연결시키게 되고, 끝단부에 고정단(821)이 형성된 연결호스(82)를 포함하게 되는데, 이와 같은 공기압조절기구(80)의 연결호스(82)는 도 5에서와 같이 저주파 발생기구(60)를 이루는 접속단(62)의 고정홈(621)에 고정단(821)이 끼움결합되면서 제2개방로(23)의 내부 공기가 진공펌프(81)에 의해 흡입될 수 있도록 하게 된다.

[0064] 상기와 같이 구성된 본 발명의 실시예에 따른 부항식 저주파치료 겸용 온열기(100)는 몸체프레임(20)의 내벽(24)과 외벽(25)의 하단이 사용자의 신체와 접촉하게 되면서 제1개방로(22)를 통해 방출되는 온열에 의한 온열치료와, 제2개방로(23)를 통해 방출되는 저주파에 의한 저주파치료 및, 제2개방로(23)의 압력 강하에 의한 부항치료가 동시에 수행될 수 있게 되는 것이다.

[0065] 상술한 바와 같은, 본 발명의 실시예에 따른 부항식 저주파치료 겸용 온열기를 상기한 설명 및 도면에 따라 도시하였지만, 이는 예를 들어 설명한 것에 불과하며 본 발명의 기술적 사상을 벗어나지 않는 범위 내에서 다양한 변화 및 변경이 가능하다는 것을 이 분야의 통상적인 기술자들은 잘 이해할 수 있을 것이다.

도면의 간단한 설명

[0066] 도 1은 본 발명의 제1실시예에 따른 부항식 저주파치료 겸용 온열기의 분리 단면도;

[0067] 도 2는 본 발명의 제1실시예에 따른 부항식 저주파치료 겸용 온열기의 결합 단면도;

[0068] 도 3은 본 발명의 제2실시예에 따른 부항식 저주파치료 겸용 온열기의 외형도;

[0069] 도 4의 (a) 내지 (d)는 본 발명의 제2실시예에 따른 부항식 저주파치료 겸용 온열기가 조립되는 과정을 보여주기 위한 도면;

[0070] 도 5은 본 발명의 제2실시예에 따른 부항식 저주파치료 겸용 온열기를 이루는 공기압조절기구의 구성을 보여주기 위한 도면;

[0071] 도 6의 (a)와 (b)는 본 발명의 제3실시예에 따른 부항식 저주파치료 겸용 온열기를 보여주기 위한 도면;

[0072] 도 7의 (a) 내지 (c)는 본 발명의 제4실시예에 따른 부항식 저주파치료 겸용 온열기가 조립되는 과정을 보여주기 위한 도면이다.

[0073] *도면의 주요부분에 대한 부호의 설명*

[0074] 20 : 몸체프레임 21 : 내부공간

[0075] 22 : 제1개방로 23 : 제2개방로

[0076] 24 : 내벽 25 : 외벽

[0077] 26 : 걸림턱 27 : 돌출단

[0078] 271 : 끼움홈 272 : 통공

[0079] 28 : 걸림단 29 : 장착홈

[0080] 30 : 자석체 40 : 온열기구

[0081] 41 : 히터 411 : 단턱

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[0082] 42 : 접속용 덮개 421 : 전극단자

[0083] 60 : 저주파 발생기구 61 : 방출판

[0084] 611 : 결합홈 612 : 요홈

[0085] 62 : 접속단 621 : 고정홈

[0086] 622 : 통로 623 : 관통로

[0087] 63 : 저주파발생기 64 : 전달패드

[0088] 65 : 연결케이블 66 : LED

[0089] 67 : 저주파전달용 스프링 68a : 제1방출관체

[0090] 68b : 제2방출관체 69a, 69b : 접속단자

[0091] 80 : 공기압조절기구

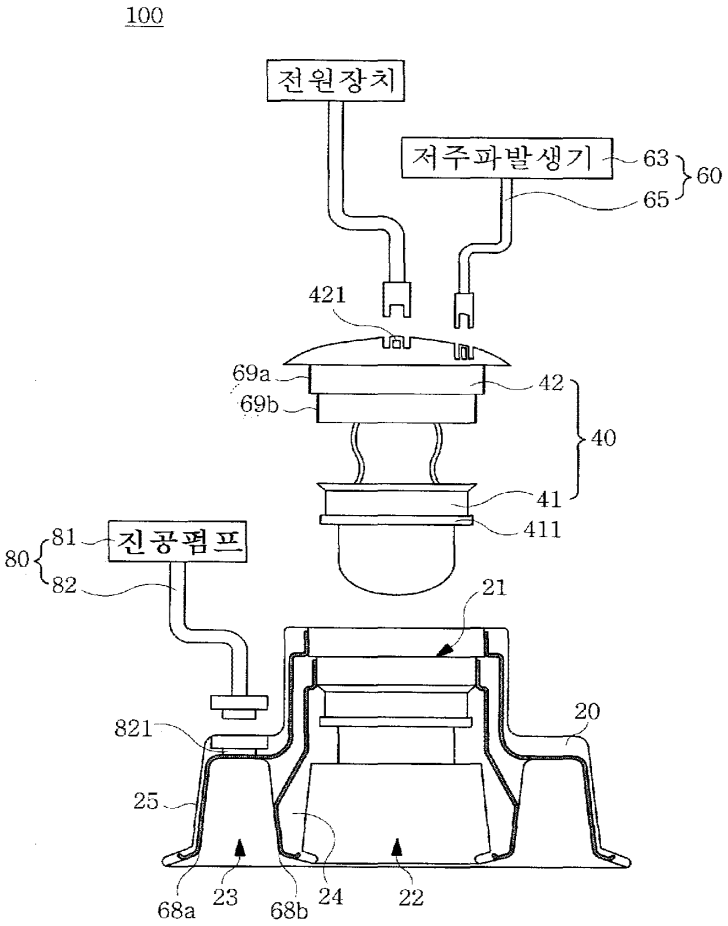
[0092] 81 : 진공펌프 82 : 연결호스

[0093] 821 : 고정단 100 : 부항식 저주파치료 겸용 온열기

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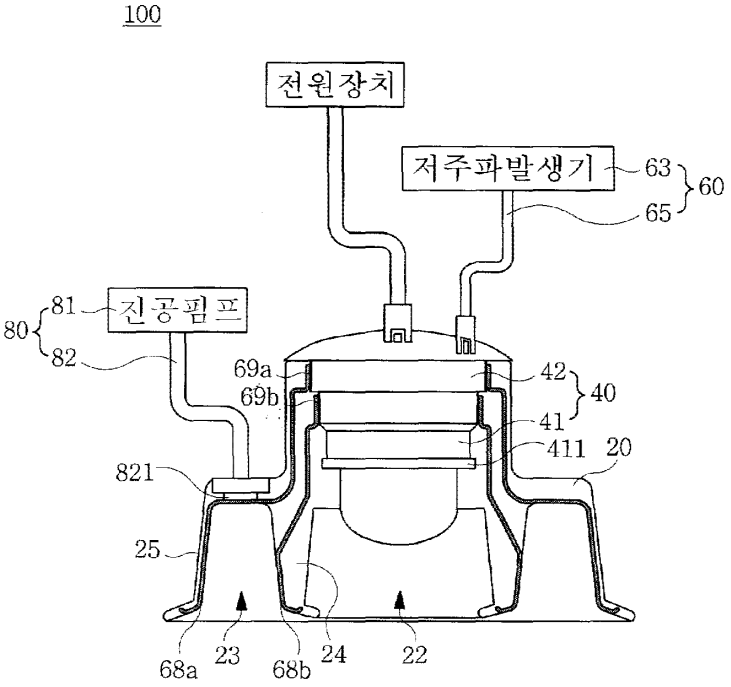
도면

도면1

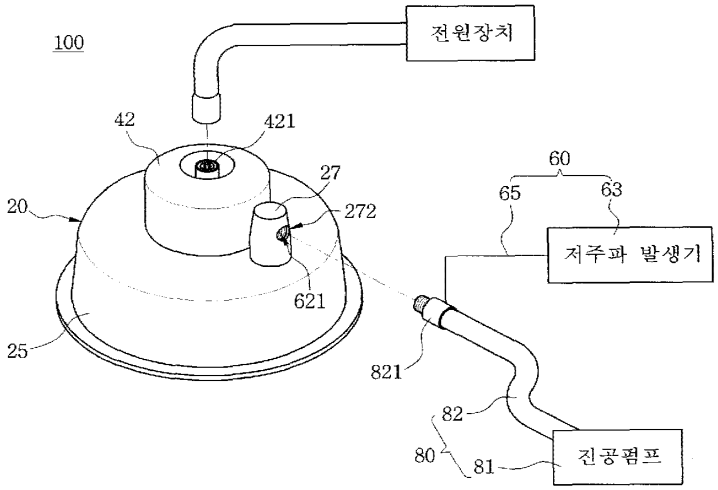


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도면2

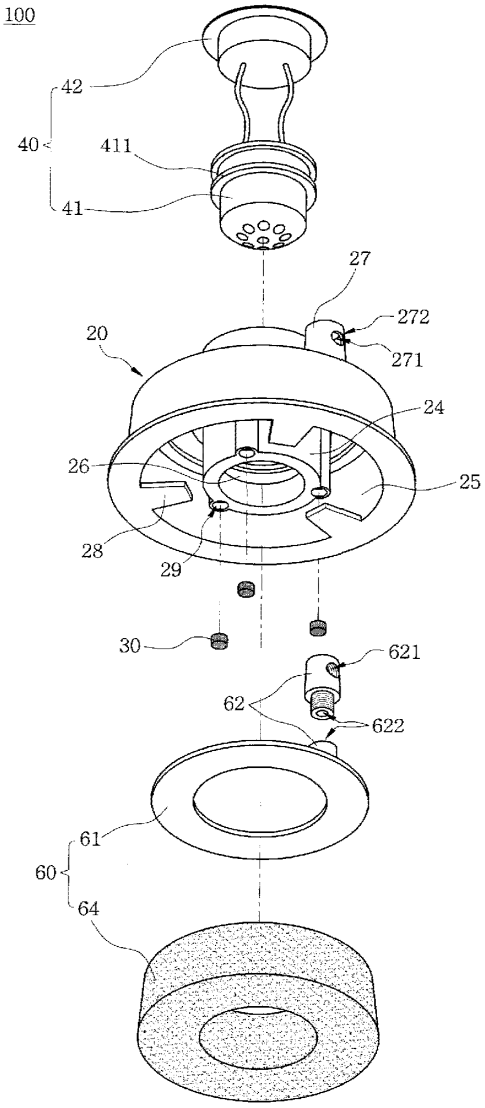


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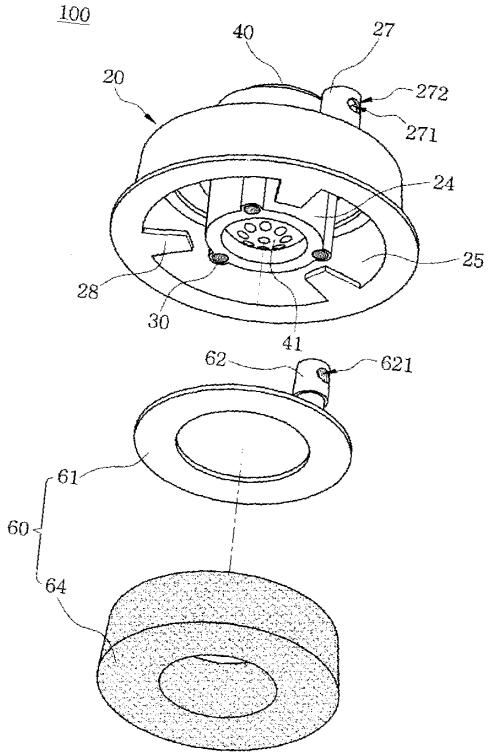


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도면4

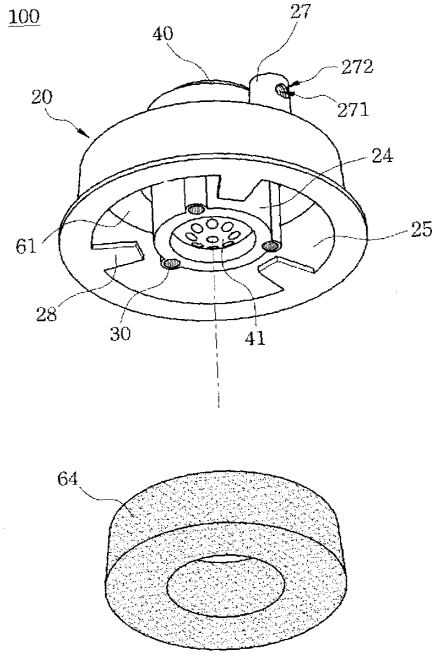


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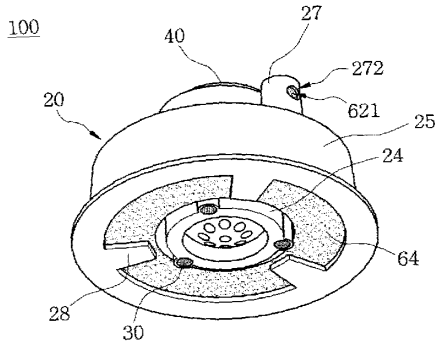


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도면4c

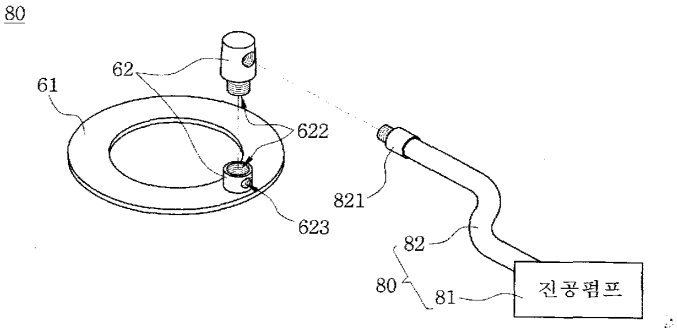


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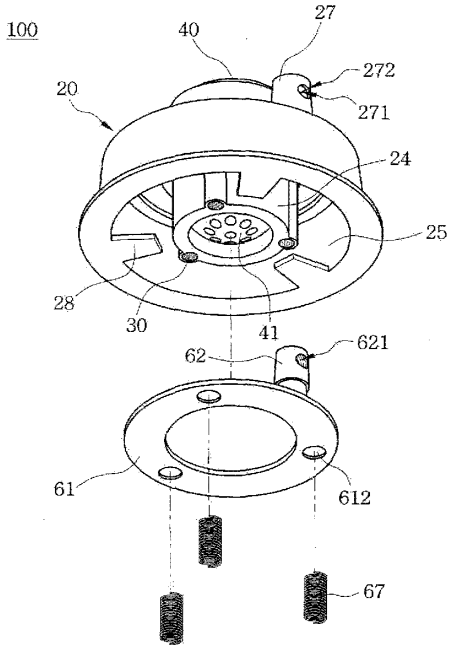


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도면5

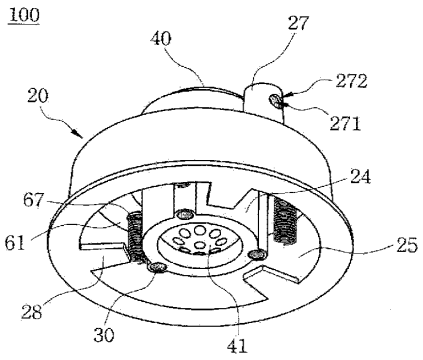


도면6a



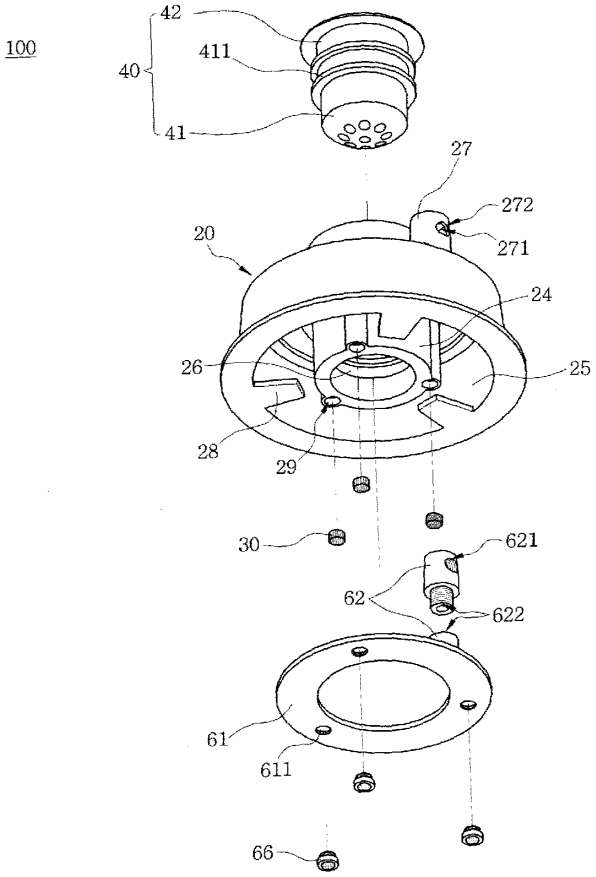
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도면6b



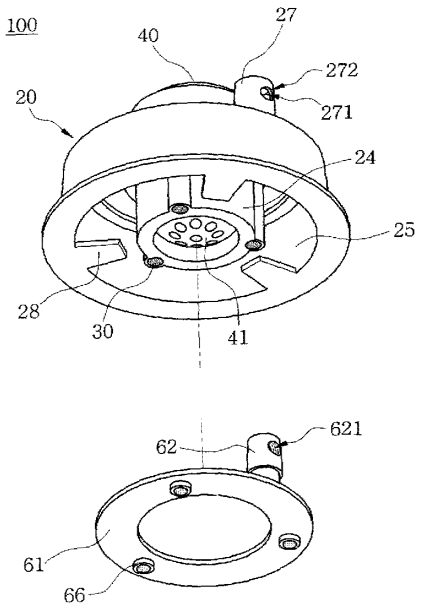
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도면7a

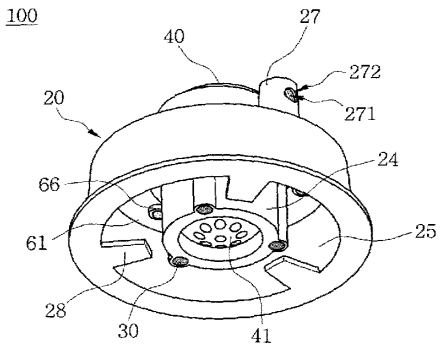


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도면7b



도면7c



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(54) Title: SLIM PROFILE HAPTIC TRANDUCERS

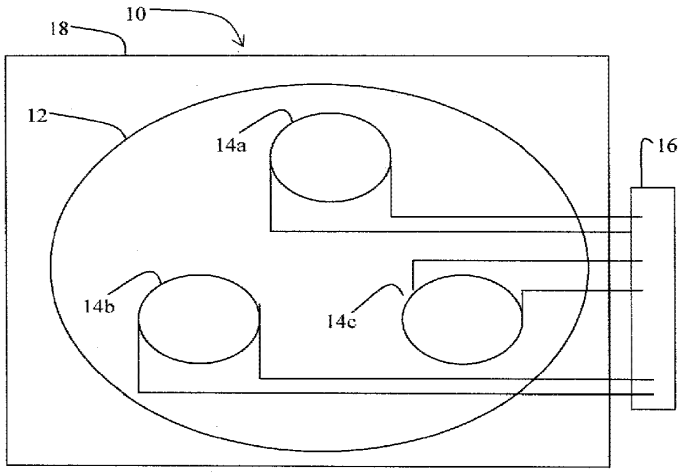


Fig. 1

(57) Abstract: A haptic transducer comprising a magnetic plate, a plurality of coils each separately couplable to a signal generator such that axis of each coil is perpendicular to the plate and all coils are on a common side of the plate, and signals may be sent from said signal generator to each coil individually.

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SLIM PROFILE HAPTIC TRANSDUCERS

BACKGROUND

The Faraday Effect shows how an electric current in a perpendicular magnetic field experiences a thrust in a third tangential direction. This is known as the Faraday Motor Effect. Similarly, movement of a wire within a magnetic field induces a current flow in what is known as the dynamo affect. Where the electrical conduit or wire is coiled, the effects are multiplied as each segment of the coil that is perpendicular to the magnetic field causes or experiences the thrust.

There are a number of transducers that comprise arrangements of coils and magnets that utilize this effect. Some create vibrations in response to current fluctuations in the coil and others convert physical movement into electronic signals. Essentially the same arrangement can be used for either purpose.

All physical bodies have natural frequencies of vibration and at these frequencies, harmonic motion is created and wide amplitude vibrations are generated. Dependent on the design of the component magnets, coils and housing, transducers may be designed to vibrate at vibrate significantly at specific desired frequencies or frequency ranges of applied electronic signals, or to generate significant electronic signals by vibrations of desired frequencies or frequency ranges.

Where asymmetrical low frequency signals are applied to a coil of such a transducer, a directional tug may be induced in the magnet and felt by someone contacting the magnet and the surrounding casing. This phenomenon is known as forced feedback.

In 1994, Aura Systems launched the Interactor Vest, a wearable force-feedback device that monitors an audio signal and uses electromagnetic actuator technology to convert bass sound waves into vibrations that can represent such actions as a punch or kick. The Interactor vest plugs into the audio output of a stereo, TV, or VCR and the user is provided with controls that allow for adjusting of the intensity of vibration and filtering out of high frequency sounds. The Interactor Vest is worn over the upper torso and the audio signal is reproduced through a speaker embedded in the vest. After selling 400,000 of its Interactor Vest, Aura began shipping the Interactor Cushion, a device which operates like the Vest but instead of being worn, it's placed against a seat back and the user must lean against it.

US 8,995,692 to Mor Efrati describes a number of transducers comprising various arrangements of coils and magnets that provide bass frequency and infra-

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sound vibrations that can be worn on the body and enhance the sensations of the wearer. A bass vibrator can be worn together with earphones and will provide a more realistic music experience to the wearer than one wearing earphones alone, since earphones do not effectively reproduce the low frequency notes.

Very low frequency vibrations or infra-sound may not be audibly detected by someone, but they cause a feeling of trepidation that may be associated with fear of the unknown, spookiness, and the like. It has been theorized that it is the non-audible low frequency vibrations in a lion's roar that creates panic.

SUMMARY OF THE INVENTION

The present invention is directed to providing a transducer that can be used for either generating electronic signals in response to physical movement or generating physical movement in response to electronic signals supplied thereto. The transducer is characterized by having a slim profile, making it particularly suitable for a wide variety of uses such as inclusion in smart phones.

A first embodiment is directed to a haptic transducer comprising a magnetic plate, a plurality of coils each separately couplable to a signal generator such that axis of each coil is perpendicular to the plate and all coils are on a common side of the plate, and signals may be sent from said signal generator to each coil individually.

Typically, the haptic transducer comprises three or four coils arranged in a layer in a non-linear arrangement.

In some embodiments, the coils are pancake coils.

In other embodiments, the coils are helical coils.

Typically, the magnetic plate is a permanent magnetic disc.

In some embodiments, one surface of the disc is North seeking and the opposite surface is South seeking.

In some embodiments, one end is North seeking and the opposite end is South seeking.

In some embodiments, the coils are adhered directly to the magnetic plate.

In some embodiments, the coils are adhered to one side of a housing and the magnetic plate is adhered to an opposite side of the housing.

In some embodiments, the coils are attached to one side of a housing and the magnetic plate is suspended within the housing by wires.

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Optionally, the housing comprises a material selected from the group comprising aluminum, copper, wood, cardboard, plastic, fiber reinforced polymer and spring steel.

BRIEF DESCRIPTION OF FIGURES

For a better understanding of the invention and to show how it may be carried into effect, reference will now be made, purely by way of example, to the accompanying drawings.

With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention; the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice. In the accompanying drawings:

Fig. 1 is a schematic illustrational view of a transducer in accordance with a first embodiment of the invention from below;

Fig. 2 is a schematic illustrational perspective side view of a transducer in accordance with a first embodiment of the invention;

Fig. 3 is a schematic illustrational view of a transducer in accordance with a second embodiment of the invention from below;

Fig. 4 is a schematic illustrational side view of a transducer in accordance with a second embodiment of the invention.

DESCRIPTION OF EMBODIMENTS

The present invention is directed to providing a transducer that can be used for either generating electronic signals in response to physical movement or generating physical movement in response to electronic signals supplied thereto. The transducer is characterized by having a slim profile, making it particularly suitable for a wide variety of uses such as inclusion in smart phones.

With reference to Figs. 1 and 2, there is shown schematic views of a transducer in accordance with a first embodiment of the invention from below and from the side.

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The transducer 10 consists of a plate of ferromagnetic material 12 and a plurality of helical coils 14a, 14b, 14c separately couplable to a signal generator 16 such that the axis of each coil X (XX) is perpendicular to the plate 12 and signals may be sent to each coil 14a, 14b, 14c individually. Although three coils are shown, a different number, such as four coils, for example, may be provided.

The plurality of coils are arranged in a single layer, but in a non-linear arrangement such that supplying separate asymmetrical signals to each coil can cause the plate of ferromagnetic material to be tugged in any desired direction.

As shown in Figures 1 and 2, the coils 14a, 14b, 14c may be conventional coils and the magnetic plate may be a permanent magnetic disc 12 such that the top surface thereof 13 is North Seeking and the bottom surface 11 is South Seeking.

Alternatively, the top surface thereof 13 is South Seeking and the bottom surface 11 thereof is North Seeking.

The coils 14a, 14b, 15c are adhered to one side of a surface 16 which may be part of a housing 18 covering the magnetic plate 12, where and the magnetic plate 12 is adhered to the opposite side of the coils. The housing may be an open framework or a closed box and may serve like a sounding board, vibrating with the magnet.

The housing may comprise a non-ferromagnetic frame such as aluminum or copper, for example. Alternatively, the non-magnetic plate may comprise a dielectric material such as wood, cardboard, plastic or a fiber reinforced polymer. It may also be ferromagnetic, comprising a spring steel, for example.

With reference to Figs. 3 and 4, there is shown schematic views of a transducer 20 in accordance with a second embodiment of the invention from below and from the side. In this transducer 20, there are four pancake coils 24a, 24b, 24c, 24d.

The magnetic plate 22 may still be disc shaped, but may be magnetized in different ways. For example, a first end 21 of the magnetic plate 22 is North seeking and a second end 23 is South seeking. However, the magnetic plate need not be bar shaped and may still be disc-shaped.

Unlike helical coils 14, pancake coils 24 are flat coils. Pancake coils enable very low profile transducers to be made, such as suitable for inclusion within the casing of smartphones, tablet computers, laptop computers, WII boards and thin electronic games, for example.

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However, helical coils can, in some instances be used for such applications. To some extent, the number of coils is arbitrary. The first embodiment has three helical coils and the second has four pancake coils, but transducers of the invention may have different numbers, such as three pancake coils, four helical coils, or two helical and two pancake coils, for example.

In one embodiment the coils are adhered directly to the magnetic plate.

In other embodiments, the coils are attached to one side of the housing and the magnetic plate is suspended within the housing by wires.

In some embodiments, the coils and the magnetic plate are both attached to opposite sides of a frame. They may be attached to the insides of a housing, for example.

Two embodiments of the present invention have been illustrated and several more have been described. It will be understood that two or three pancake of helical coils can be provided and the magnetic plate may be magnetized in either direction, and may be flipped. Thus various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other embodiments are within the scope of the following claims.

Thus persons skilled in the art will appreciate that the present invention is not limited to what has been particularly shown and described hereinabove. Rather the scope of the present invention is defined by the appended claims and includes both combinations and sub combinations of the various features described hereinabove as well as variations and modifications thereof, which would occur to persons skilled in the art upon reading the foregoing description.

In the claims, the word `comprise_, and variations thereof such as `comprises_, `comprising_ and the like indicate that the components listed are included, but not generally to the exclusion of other components.

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CLAIMS

1. A haptic transducer comprising a magnetic plate, a plurality of coils each separately couplable to a signal generator such that axis of each coil is perpendicular to the plate and all coils are on a common side of the plate, and signals may be sent from said signal generator to each coil individually.
2. The haptic transducer of claim 1 comprising three or four coils arranged in a layer in a non-linear arrangement.
3. The haptic transducer of claim 1 wherein said coils are pancake coils.
4. The haptic transducer of claim 1 wherein said coils are helical coils.
5. The haptic transducer of claim 1 wherein the magnetic plate is a permanent magnetic disc.
6. The haptic transducer of claim 1 wherein, one surface is north seeking and the opposite surface south seeking.
7. The haptic transducer of claim 1 wherein one end is north seeking and the opposite end is south seeking.
8. The haptic transducer of claim 1 wherein the coils are adhered directly to the magnetic plate.
9. The haptic transducer of claim 1 wherein the coils are adhered to one side of a housing and the magnetic plate is adhered to an opposite side of the housing.
10. The haptic transducer of claim 9 wherein the housing comprises a material selected from the group comprising aluminum, copper, wood, cardboard, plastic, fiber reinforced polymer and spring steel.
11. The haptic transducer of claim 1 wherein the coils are attached to one side of a housing and the magnetic plate is suspended within the housing by wires.
12. The haptic transducer of claim 11 wherein the housing comprises a material selected from the group comprising aluminum, copper, wood, cardboard, plastic, fiber reinforced polymer and spring steel.

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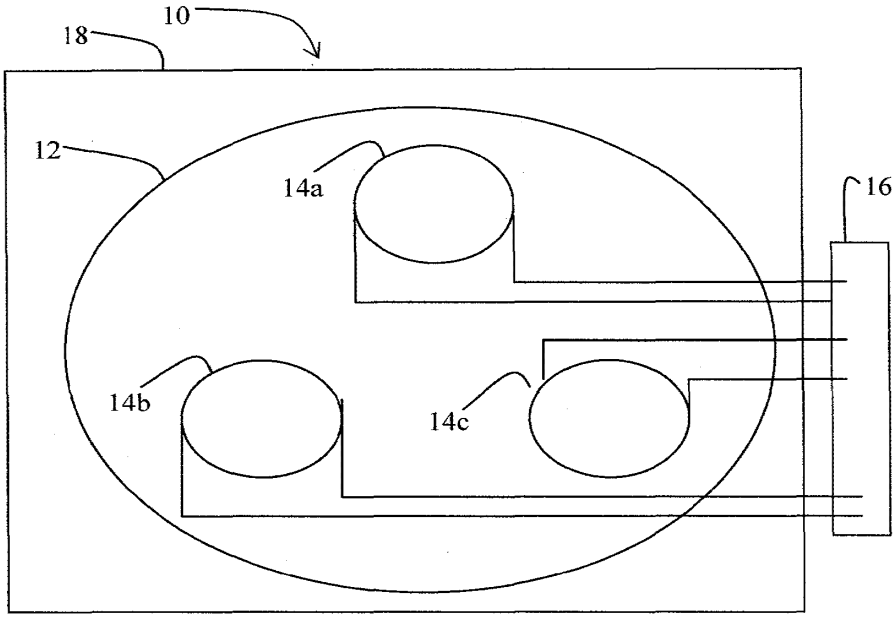


Fig. 1

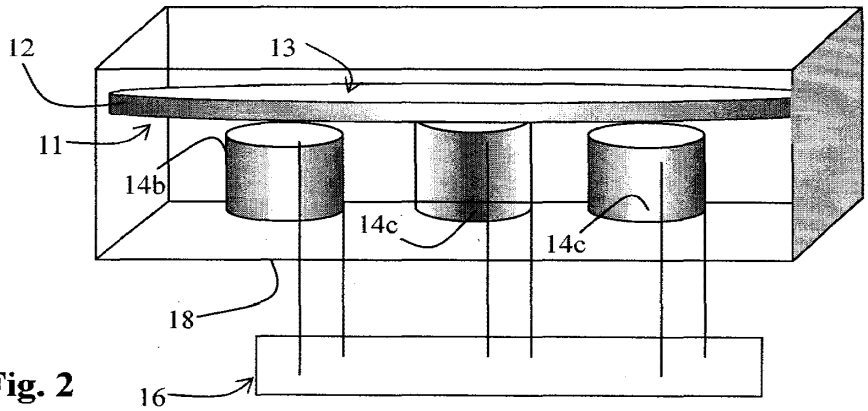


Fig. 2

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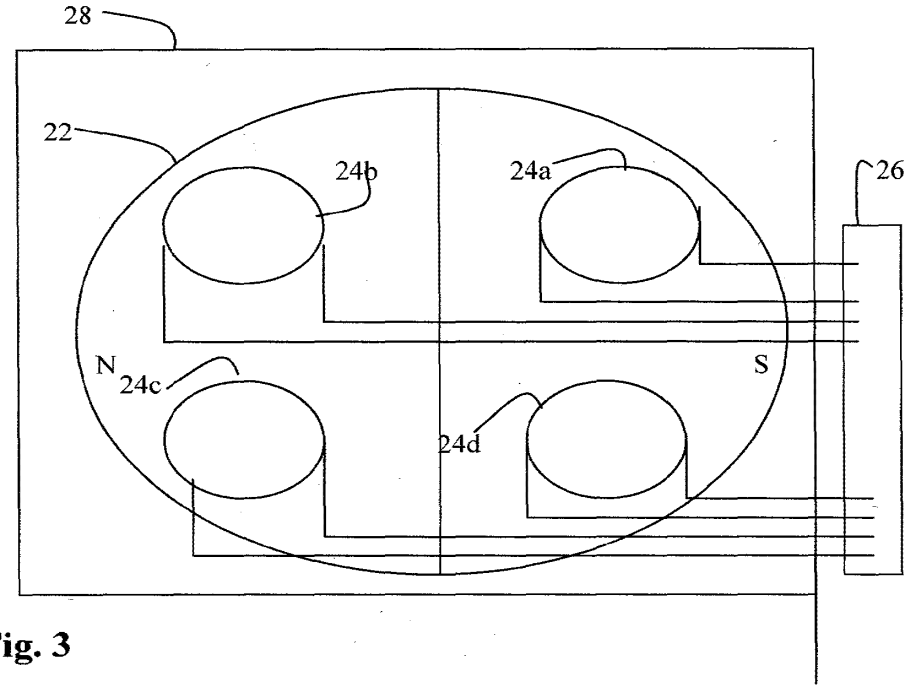


Fig. 3

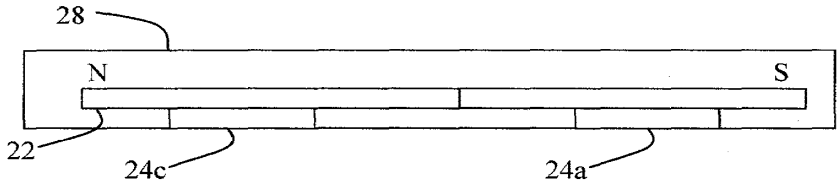


Fig. 4

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2017/050135

A. CLASSIFICATION OF SUBJECT MATTER
IPC (2017.01) H02K 33/12, H02K 1/34, H04R 1/00, H04R 11/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (2017.01) H02K 33/12, H02K 1/34, H04R 1/00, H04R 11/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Databases consulted: Esp@cenet, Google Patents, FamPat database
Search terms used: tactile , haptic , transducer , force feedback , magnet , infrasonic , coil , very low frequency

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013193779 A1 MINEBEA MOTORMANUFACTURING CORP. 01 Aug 2013 (2013/08/01) entire document	1-12
A	EP 3002958 A1 Woojer Ltd. 06 Apr 2016 (2016/04/06) entire document	1-12
A	US 6217508 B1 Symphonix Devices, Inc. 17 Apr 2001 (2001/04/17) entire document	1-12
A	WO 2006028165 A1 NAMIKI SEIMITSU HOUSEKI KABUSHIKIKAISHA 16 Mar 2006 (2006/03/16) entire document	1-12
A	US 2014321681 A1 Vibrant Med-El Hearing Technology Gmbh 30 Oct 2014 (2014/10/30) entire document	1-12

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 May 2017	23 May 2017
Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616	Authorized officer COHAY Mattan Telephone No. 972-2-5651611

Form PCT/ISA/210 (second sheet) (January 2015)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2017/050135

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
US 2013193779 A1	01 Aug 2013	US 2013193779 A1	01 Aug 2013
		US 9350220 B2	24 May 2016
		CN 203206089 U	18 Sep 2013
		JP 2013154290 A	15 Aug 2013
		JP 6049266 B2	21 Dec 2016
EP 3002958 A1	06 Apr 2016	EP 3002958 A1	06 Apr 2016
US 6217508 B1	17 Apr 2001	US 6217508 B1	17 Apr 2001
		AU 6382499 A	06 Mar 2000
		WO 0010361 A2	24 Feb 2000
		WO 0010361 A3	15 Jun 2000
		WO 0010361 A9	05 Oct 2000
WO 2006028165 A1	16 Mar 2006	WO 2006028165 A1	16 Mar 2006
		JP 2006075734 A	23 Mar 2006
		TW 200621385 A	01 Jul 2006
		TW I382879 B	21 Jan 2013
US 2014321681 A1	30 Oct 2014	US 2014321681 A1	30 Oct 2014
		US 9113268 B2	18 Aug 2015
		WO 2014179274 A1	06 Nov 2014

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Application Data Sheet 37 CFR 1.76

The Application Data Sheet is part of the provisional or non-provisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.

Inventor Information

of inventors: 1

1. **Matthew Robert Leaper**

Residence Information
US Residency
Omaha, NE
UNITED STATES

Mailing Address
1039 South 21 Street, Unit #1
Omaha, NE 68108
UNITED STATES

Application Information

Customer number	158475 -
Correspondence address	----
Title of invention	COMMUNICATION DEVICES, METHODS, AND SYSTEMS
Attorney docket number	DF-P01-US08
Entity status	Small
Application type	Nonprovisional Application under 35 USC 111(a)

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Subject matter	Utility
Total number of drawing sheets	14
Suggested figure for publication	...
Filing by reference	No
Publication request	Normal eighteen-month publication

Representative Information

of representatives: 1

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).

Customer number 158475

Domestic Benefit/National Stage Information

of benefit claims: 7

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c), 386(c), or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior app status	Patented
Application number	18143142
Continuity type	Continuation of
Prior app number	18092398
Filing Date	01/02/2023
Patent number	11684313
Issue date	06/27/2023

Prior app status Patented

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Application number	18092398
Continuity type	Continuation of
Prior app number	17213117
Filing Date	03/25/2021
Patent number	11589816
Issue date	02/28/2023

Prior app status	Patented
Application number	17213117
Continuity type	Continuation of
Prior app number	16757482
Filing Date	04/20/2020
Patent number	10959674
Issue date	03/30/2021

Prior app status	Pending
Application number	16757482
Continuity type	A 371 of international
Prior app number	PCT/US18/56814
Filing Date	10/22/2018

Prior app status	Pending
Application number	PCT/US18/56814
Continuity type	Claims benefit of provisional
Prior app number	62676949
Filing Date	05/26/2018

Prior app status	Pending
Application number	PCT/US18/56814
Continuity type	Claims benefit of provisional
Prior app number	62575951
Filing Date	10/23/2017

Prior app status	Pending
Application number	18388489

Petitioner Therabody Ex-1004, 0592

Continuity type	Continuation of
Prior app number	18143142
Filing Date	05/04/2023

Foreign Priority Information

of foreign priority claims: 0

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the Application Data Sheet constitutes the claim for priority as required by 35 U.S.C. 119 (b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Data was not provided for this section.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Checking this box will cause the application to be examined under the first inventor to file provisions of the AIA.

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization or Opt-Out of Authorization to Permit Access

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant must opt-out of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE:
This section of the Application Data Sheet is ONLY reviewed and processed with the INITIAL filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a

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foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. **Priority Document Exchange (PDX)**
Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h) (1).

B. **Search Results from U.S. Application to EPO**
Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with the search results from the instant application.

NOTE:
Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Applicant Information

of applicants: 0

The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46.

Data was not provided for this section.

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Assignee Information including Non-Applicant Assignee Information

of assignees: 1

An assignee-applicant identified in the "Applicant" section will appear on the patent application as an applicant.

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

DATAFEEL INC.
1629 K STREET NW, SUITE 300
WASHINGTON, DC 20006
UNITED STATES

Organization

Signature

NOTE:

This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c)**

This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.

See CFR 1.4(d) for the manner of making signatures and certifications.

Signature	First name	Last name	Registration #	Date
/Matthew Leaper/	Matthew	Leaper	73966	12/01/2023

Inquiry of history information

Abstract (PatentsApplication2012-268834)

*** NOTICES ***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

[Document Name]Abstract

[Problem]To provide a high-frequency beauty treatment device capable of immediately bodily sensing the action and effect of the high-frequency beauty treatment device.

[Means for solving]The high-frequency beauty treatment apparatus includes a housing, a pair of rotary electrodes partially exposed in the housing for applying electric stimulation by a high-frequency current to a muscle of a person to be treated, a heater disposed between the rotary electrodes on a treatment surface of the housing, a power supply device for supplying power to the heater and the electrodes, and a power supply control device for controlling power supply to the heater and the electrodes.

[Selected drawing]Fig.1

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(19)日本国特許庁(JP)　(12)特　許　公　報(B2)　(11)特許番号
特許第6178566号
(P6178566)
(45)発行日　平成29年8月9日(2017.8.9)　(24)登録日　平成29年7月21日(2017.7.21)

(51)Int.Cl.		F I		
A61N 1/36	(2006.01)	A61N	1/36	
H05B 3/00	(2006.01)	H05B	3/00	345
A61H 23/02	(2006.01)	A61H	23/02	386
A61H 7/00	(2006.01)	A61H	7/00	320A

請求項の数 10　(全 11 頁)

(21)出願番号　特願2012-268834(P2012-268834)
(22)出願日　平成24年12月7日(2012.12.7)
(65)公開番号　特開2014-113272(P2014-113272A)
(43)公開日　平成26年6月26日(2014.6.26)
審査請求日　平成27年11月11日(2015.11.11)

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特許業務法人サクラ国際特許事務所
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東京都江東区古石場１丁目４番４号　ヤーマン株式会社内

審査官　寺澤　忠司

最終頁に続く

(54)【発明の名称】高周波美容処理装置

(57)【特許請求の範囲】
【請求項１】
筐体と、
前記筐体に設けられ、被施術者の皮膚に高周波電流による電気的刺激を与えるための対をなす回転電極と、
前記回転電極間に配置された金属性の伝熱部と、
前記伝熱部に熱的に接続するヒータと、
前記ヒータ及び前記回転電極への電力供給を制御する給電制御装置と
を備えたことを特徴とする高周波美容処理装置。
【請求項２】
前記給電制御装置は、筐体の前記ヒータ近傍に配置された温度検出器と、
前記温度検出器の出力により前記ヒータへの給電を制御する給電制御手段とを含むことを特徴とする請求項１記載の高周波美容処理装置。
【請求項３】
前記給電制御装置に制御されて前記ヒータ及び前記回転電極へ電力を給電する電源をさらに備えたことを特徴とする請求項１又は２に記載の高周波美容処理装置。
【請求項４】
前記伝熱部は、前記回転電極間に少なくとも２つ配置され、当該２つの伝熱部は、前記回転電極が並ぶ方向と直交する方向に沿って互いに所定の間隔をおいて位置することを特徴とする請求項１乃至３のいずれか１項に記載の高周波美容処理装置。

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【請求項５】
前記給電制御装置が、前記2つの伝熱部への電力供給を制御することを特徴とする請求項４に記載の高周波美容処理装置。
【請求項６】
前記回転電極は、平行する一対のローラ電極又は一対の球電極であることを特徴とする請求項１乃至５のいずれか1項に記載の高周波美容処理装置。
【請求項７】
前記伝熱部が、外側に凸の湾曲面又は球面を備えることを特徴とする請求項１乃至６のいずれか1項に記載の高周波美容処理装置。
【請求項８】
前記給電制御装置は、前記回転電極と、前記伝熱部への電力供給制御をそれぞれ独立的に行うことが可能な給電制御手段を含むことを特徴とする請求項５乃至７のいずれか１項に記載の高周波美容処理装置。
【請求項９】
前記給電制御装置が周波数変換部を備え、前記回転電極及び前記伝熱部には同一又は異なる周波数の高周波電流を供給し、前記ヒータには直流又は所定の周波数の交流を供給することを特徴とする請求項１乃至８のいずれか１項に記載の高周波美容処理装置。
【請求項１０】
前記給電制御装置は、前記筐体の振動を検出する加速度センサと、前記加速度センサの出力により前記ヒータへの給電を独立的にオンオフする給電制御手段を含むことを特徴とする請求項１乃至９のいずれか1項記載の高周波美容処理装置。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、高周波美容処理装置に関する。
【背景技術】
【０００２】
従来から、顔や手足などの皮膚に対して高周波電流を通電することにより、肌の老化防止やニキビの治癒、シミ・そばかすその他の皮膚のトラブルの改善を図ることが可能な高周波美容処理装置が知られている（例えば、特許文献１参照）。
【先行技術文献】
【特許文献】
【０００３】
【特許文献１】国際公開第２０１１/１６２１７４号
【発明の概要】
【発明が解決しようとする課題】
【０００４】
上記した高周波美容処理装置を用いた場合、被施術者は、高周波電流の刺激を受けた筋肉が収縮することによって発生する熱（収縮熱）を感じて高周波美容処理装置の作用や効果を体感することができる。
しかし、これらの高周波美容処理装置では、高周波電流の通電開始から収縮熱によって筋肉が安定した一定温度に達するまでに時間がかかり、使用者が最適な効果を短時間で体感することができないという問題があった。
本発明は、上記した事情に鑑みてなされたものであり、体の内側及び皮膚の表面から暖めることによって、高周波美容処理装置の作用や効果をより速やかに体感することが可能な高周波美容処理装置を提供することを目的とする。
【課題を解決するための手段】
【０００５】
本発明の実施形態の高周波美容処理装置は、筐体と、前記筐体に一部を露出させて備えた、被施術者の筋肉に高周波電流による電気的刺激を与えるための対をなす回転電極と、

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前記筐体の処理面の前記回転電極間に配置されたヒータと、前記ヒータ及び前記電極へ給電する電源装置と、前記ヒータ及び前記電極への給電を制御する給電制御装置とを備える。

前記給電制御装置は、筐体の前記ヒータ近傍に配置された温度検出器と、前記温度検出器の出力により前記ヒータへの給電を制御する給電制御手段とを含むことができる。

前記筐体の前記対をなす回転電極間には、開口が形成され、前記ヒータは前記開口の奥に前記開口を向けて配置されている。

【０００６】

本発明の実施形態の高周波美容処理装置は、前記筐体の前記回転電極間には、金属性の伝熱部が配置され、前記ヒータは前記伝熱部に接触し又は近接して配置されることがある。

前記対をなす回転電極間には、個々の回転電極を結ぶ線と直交する方向に所定の間隔をおいて固定電極が配置されている。前記固定電極は、前記金属製の電熱部により形成することができる。前記対をなす回転電極は、平行する一対のローラ電極又は一対の球電極で構成することができる。

【０００７】

本発明の実施形態の高周波美容処理装置は、前記固定電極が、外側に凸の湾曲面又は球面をなしていることがある。前記給電制御装置は、前記回転電極と、固定電極の給電制御を独立的に行うことが可能な給電制御手段を含むことが望ましい。前記給電制御装置が周波数変換部を備え、前記回転電極及び前記固定電極には同一又は異なる周波数の高周波電流を供給し、前記ヒータには直流又は所定の周波数の交流を供給するようにしてもよい。前記給電制御装置は、前記筐体の振動を検出する加速度センサと、前記加速度センサの出力により前記ヒータへの給電を独立的にオンオフする給電制御手段を含むこともできる。前記放熱孔には遠赤外線透過部材が配置されることが望ましい。

【発明の効果】

【０００８】

本発明の高周波美容処理装置によれば、筋肉に対する高周波電流の通電のみにより得られる体感温度に比べて、体感温度の実質的な上昇が早くなるので、効果をより速やかに実感することができる。

【図面の簡単な説明】

【０００９】

【図１】第１の実施形態の高周波美容処理装置１を示す斜視図。

【図２】高周波美容処理装置１の一部の断面を拡大して示す拡大断面図。

【図３】高周波美容処理装置１が備える印刷回路基板６０のブロック図。

【図４】高周波美容処理装置１の動作を示すフローチャート。

【図５】第２の実施形態の高周波美容処理装置２を示す斜視図。

【図６】第３の実施形態の高周波美容処理装置３を示す斜視図。

【発明を実施するための形態】

【００１０】

［第１の実施形態］

以下、本発明に係る第１の実施形態を図１～４に基づいて説明する。図１は、高周波美容処理装置１を示す斜視図である。図２は、高周波美容処理装置１の一部の断面を拡大して示す拡大断面図である。図３は、高周波美容処理装置１が備える印刷回路基板６０のブロック図である。図４は、高周波美容処理装置１の動作を示すフローチャートである。

（高周波美容処理装置１について）

図１に示すように第１の実施形態の高周波美容処理装置１は、一端側が処理部Ａ、他端側が把持部Ｂとされた細長いハウジング１０を備えている。

処理部Ａ側には、矩形の開口（放熱孔）１２ａ及び回転軸４１をハウジング１０の長手方向と直交させたローラ電極４０が周面の一部をハウジング１０から露出させて回転可能に装着されている。

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【００１１】
開口１２ａの奥には主放熱面２０ａを開口１２ａ側に向けてヒータ２０が配置されている。
一対のローラ電極４０を構成する個々の円柱状の電極４０ａ，４０ｂ間には、開口１２ａを挟んで固定電極５０が周面の一部を高さがローラ電極４０の高さと略等しくなるようにハウジング１０から露出させて固定されている。
ハウジング１０の把持部Ｂ側には、二次電池３０と、この二次電池３０の電流を所定の周波数に変換するなどしてヒータ２０、ローラ電極４０、固定電極５０への給電をＯＮ・ＯＦＦする半導体装置などを搭載した印刷回路基板６０が収容される。ハウジング１０には、二次電池３０の充電回路を商用電源に接続するための電源コード７０が着脱自在に取り付けられる。
【００１２】
この実施形態の高周波美容処理装置１によれば、施術者が、被施術者の皮膚に対してローラ電極４０及び固定電極５０を当接させることによって、高周波電流を被施術者の皮膚に通電させることができる。さらにこの実施形態の高周波美容処理装置１によれば、ヒータ２０によって被施術者の肌面を暖めることができる。
（高周波美容処理装置１の説明）
以下、高周波美容処理装置１の各部を詳細に説明する。
ハウジング１０は、プラスチックを射出成形することにより直方体形状に形成されている。ハウジング１０は、塩化ビニル樹脂、ポリエチレン及びポリカーボネートなどを難燃性化したプラスチックにより形成することが望ましい。
【００１３】
ハウジング１０の処理部Ａ側には、被施術者の皮膚側に対向する面１２とこの面１２の反対側の操作ボタンなどが配設される操作面１３が設けられる。
面１２には、ローラ電極４０を露出するための長方形の一対の穴１２ｂがハウジング１０の長手方向に沿って互いに平行に形成される。さらに面１２には、開口１２ａを挟んでその両側に固定電極５０がその一部を露出して配置されている。
図２に拡大断面図に示すように、開口１２ａ近傍には、検知部１７ａを開口１２ａに臨ませてサーミスタのような温度計１７が配置される。この温度計１７は、図１に示す印刷回路基板６０と電気的に接続されている。
【００１４】
開口１２ａは、ヒータ２０から放射された遠赤外線を透過させる遠赤外線透過窓１８で覆われている。遠赤外線透過窓１８を構成する材料としては、例えば反射防止コートが施されたカルコゲナイドガラスなどが適している。遠赤外線透過窓１８を構成する材料は、遠赤外線を高い透過率（例えば９０％以上の透過率）で透過させるものであれば特に限定されず、例えば石英ガラスを用いてもよい。また例えば、シリコン窓、サファイア窓を遠赤外線透過窓１８として用いることもできる。
遠赤外線透過窓１８によれば、ヒータ２０から放射された遠赤外線を高周波美容処理装置１外部に放出しつつ、高周波美容処理装置１外部からの化粧液などの水分やゴミなどが開口１２ａから高周波美容処理装置１内に侵入することを防止することができる。遠赤外線透過窓１８は、必要に応じて取り外すこともできる。
図１に示す操作面１３には、ローラ電極４０及び又は固定電極５０への電流の供給をＯＮ・ＯＦＦするための物理的なスイッチを突出させるための孔が設けられている（図示せず）。
【００１５】
「スイッチ」は、液晶パネルに表示されたタッチ式のスイッチであってもよい。この場合には、操作面１３には小型の液晶パネルが配設される。
ヒータ２０は、板状に形成されたセラミックヒータである。ヒータ２０は、交流電圧または直流電圧を印加されることによって発熱する。ヒータ２０の発熱温度は、印刷回路基板６０によって制御される。ヒータ２０の発熱可能範囲は常温～５００℃程度である。た

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だし、この実施の形態では、ヒータ２０は、発熱温度が最高６０℃前後となるように印刷回路基板６０によって制御される。なお、ヒータ２０は、セラミックヒータに限定されず、遠赤外線を効率よく放射する物であればよい。例えば、ヒータ２０をハロゲンヒータ、カーボンヒータ、ニクロム線ヒータまたはセラミックのプレートに高温に発熱する発熱体を密着させたものなどで構成することもできる。

【００１６】

二次電池３０は、一般的には充放電可能な二次電池が用いられるが、燃料電池やキャパシタを使用することもできる。

ローラ電極４０は、ローラ状に形成されている。ローラ電極４０は、それぞれ一部の表面を穴１２ｂから露出させて回転軸４１によって軸支されてハウジング１０内部に回転自在に設けられる。

ローラ電極４０は、穴１２ｂに設けられた図示はしない摺動電極を介して印刷回路基板６０と電気的に接続される。ローラ電極４０は、被施術者の肌面上を転動しつつ施術者の皮膚に対して高周波電流を通電させる。被施術者は、ローラ電極４０を肌面上で転動させることによって肌を伸ばしたり押したりすることができ、このことによるマッサージ効果を得ることもできる。

【００１７】

固定電極５０は、ローラ電極４０の露出した一部の表面と面一になるように表面を露出して設けられる。固定電極５０は、印刷回路基板６０と電気的に接続されている。固定電極５０は、被施術者の皮膚に対して高周波電流を通電させる。固定電極５０は、少なくとも穴１２ｃから露出する表面が、ハウジング１０の外側に湾曲するように丸みを帯びた形状を有するように形成されることが望ましい。このような丸みを帯びた形状を有することによって、被施術者の皮膚との接触面積を小さくすることができる。この結果、被施術者の肌面に接触したときの、肌面に対するストレスを低減することができる。

図３に示すように、印刷回路基板６０には、それぞれ制御部６１、電流制御部６２、ヒータ制御部６３及びセンサ部６４として機能する種々の制御回路が形成される。制御部６１は、電流制御部６２、ヒータ制御部６３及びセンサ部６４を制御する制御回路で構成される。

制御部６１は、温度計１７の出力を換算してヒータ２０によって暖められた人の肌面の温度を算出することができる。

【００１８】

制御部６１は、ハウジング１０の移動やローラ電極４０の振動の有無を示す検知信号をセンサ部６４が備える加速度センサ６４ａから受信する。制御部６１は、受信した検知信号や温度計１７の出力に基づいて電流制御部６２及びヒータ制御部６３を制御して、ローラ電極４０及び又は固定電極５０への給電のＯＮ・ＯＦＦ及びヒータ２０のＯＮ・ＯＦＦを制御する。

図３に示す電流制御部６２は、印刷回路基板６０に設けた制御部６１の一部をなしており、二次電池３０から得られ、ヒータ２０、ローラ電極４０及び又は固定電極５０に供給される電流の周波数変換をおこなったり、各部に対する給電をＯＮ・ＯＦＦしたりする。例えば、ローラ電極４０及び又は固定電極５０に供給される電流として、電流制御部６２は、二次電池３０から供給される電流を所定の周波数（例えば、３００ｋＨｚ～１０ＭＨｚ）に変換する。ヒータ２０に対しては、二次電池から給電される直流をそのまま供給してもよいし、任意の周波数（例えば、０～１０ＭＨｚ）に変換し、供給してもよい。

【００１９】

ローラ電極４０及び固定電極５０へ供給される電流の周波数は、同一周波数であってもよいし、異なる周波数としてもよい。それぞれ異なった周波数の電流をローラ電極４０及び又は固定電極５０に給電することにより、周波数に応じた固有の電気的刺激を被施術者の皮膚に供給することができる。

ヒータ制御部６３は、制御部６１に制御されてヒータ２０をＯＮ・ＯＦＦする。この制御は、温度計１７により検出された温度が所定の設定温度よりも低くなった場合に、ヒー

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タ２０への給電回路を閉じ、温度計１７により検出された温度が高くなった場合には、ヒータ２０への給電回路を開くことで行う。

【００２０】

（遠赤外線の放射について）

次に図２を用いて、ヒータ２０の構造及び作用を詳しく説明する。

ヒータ２０は、断熱層１５及び反射層１６が配設された開口１２ａに対向する壁面１０ａ～１０ｃに囲まれた凹部の空間１４の奥に配置される。

ヒータ２０の主放熱面２０ａから放射された遠赤外線の一部（図中の「ＦｉｒＡ」：Far infrared rays　A参照。）は、遠赤外線透過窓１８を透過して、開口１２ａの外部に放出される。ヒータ２０の主放熱面２０ａ以外の部位（例えば、裏面２０ｂ）から放射された遠赤外線（図中の「ＦｉｒＢ」：Far infrared rays　B参照。）は、反射層１６によって反射される。この反射された遠赤外線が、赤外線透過窓１８から外部に放出される。

【００２１】

（高周波美容処理装置１の動作について）

次に、図４を参照して、高周波美容処理装置１の動作について説明する。

（１）動作開始（ステップＳ１０１～ステップＳ１０３）

施術者が操作面１３に配置された種々のスイッチの内、高周波美容処理装置１の作動スイッチを押下したことに対応して、制御部６１は、ヒータ制御部６３を制御してヒータ２０への給電を開始させる（ステップＳ１０１、１０２）。この結果、電力を供給されたヒータ２０は発熱し、遠赤外線が開口１２ａから放射される。

ヒータ２０の放射熱によって温度計１７の電気抵抗が変化する。制御部６１は、温度計１７からの出力に基づいて、ヒータ２０の発熱温度が予め設定された目標温度に達したか否かを検知する。

【００２２】

ヒータ２０の発熱温度が目標温度に達していなかった場合、制御部６１は、ヒータ２０の発熱温度が目標温度に達するまでヒータ２０への給電が継続されるように制御する（ステップＳ１０３）。

（２）ＯＮ・ＯＦＦ制御（ステップＳ１０４～Ｓ１０８のＮｏ）

制御部６１は、温度計１７の出力をヒータ２０によって暖められた人の肌面の温度に換算する。換算された肌面の温度が予め設定された温度より上だった場合、制御部６１は、ヒータ２０をＯＦＦに制御する（ステップＳ１０４のＮｏ、ステップＳ１０５）。この結果、ヒータ２０の温度が徐々に低下する。

次に、制御部６１は、ローラ電極４０及び固定電極５０への高周波電流の給電をＯＦＦにする（ステップＳ１０６）。

【００２３】

制御部６１は、人の肌面の温度が設定された温度以下になるまで、ステップＳ１０４～Ｓ１０６の処理を繰り返す。

制御部６１は、人の肌面の温度が設定された温度以下だった場合、ヒータ２０をＯＮに制御する（ステップＳ１０７）。この結果、ヒータ２０の温度は上昇する。

制御部６１は、ステップＳ１０４～Ｓ１０７の処理を加速度センサ６４ａによって高周波美容処理装置１が移動状態であることが検知されるまで繰り返す（ステップＳ１０８Ｎｏ）。ステップＳ１０４～Ｓ１０７の処理が繰り返されることで、ヒータ２０の温度はほぼ一定（例えば４２℃）に保たれる。

【００２４】

（３）高周波電流供給ＯＮ制御（ステップＳ１０８のＹｅｓ及びステップＳ１０９）

制御部６１は、加速度センサ６４ａからの検知信号を受信した場合（ステップＳ１０８のＹｅｓ）、ローラ電極４０及び固定電極５０への給電をＯＮに制御する（ステップＳ１０９）。

（４）停止処理（ステップＳ１１０、Ｓ１１１）

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制御部６１は、施術者によって、停止操作がされるまでステップＳ１０４～Ｓ１０９の処理を繰り返す（ステップＳ１１０のＮｏ）。

制御部６１は、施術者によって停止操作がされたことを検知した場合（ステップＳ１１０のＹｅｓ）、ヒータ２０、ローラ電極４０及び固定電極５０への給電をＯＦＦに制御する（ステップＳ１１１）。

【００２５】

以上のように動作する高周波美容処理装置１によれば、ローラ電極４０及び固定電極５０を被施術者の肌面に接触させた状態でハウジング１０を移動させることによって、被施術者の肌面に、高周波電流を流すことができる。そして、高周波美容処理装置１によれば、開口１２ａから放出された遠赤外線を肌に放射することによって肌面を即座に暖めることができる。

この結果、被施術者は、高周波電流の通電のみにより得られる体感温度に比べて、体感温度の実質的な上昇が早くなり、効果をより速やかに実感することができる。

【００２６】

ローラ電極４０及び固定電極５０が開口１２ａを挟むように配置されているので、被施術者はあたかもローラ電極４０及び固定電極５０によって流れる高周波電流の作用によって皮膚が温められていると感じることができる。

高周波美容処理装置１によれば、検知信号を受信しなかった場合には、ローラ電極４０及び固定電極５０への給電が行われないので、高周波美容処理装置１が被施術者の肌面上で静止状態になった場合に、高周波電流が皮膚に供給され続けることを防止できる。この結果として、高周波電流が皮膚の一か所に流れ続けることによって皮膚が火傷してしまうことを防止することができる。

【００２７】

［第２の実施形態］

次に図５を参照して、第２の実施形態について説明する。図５に示すように、この実施形態は、第１の実施形態が備えるローラ電極４０を球状の球状電極１４０に置き換えたものであり、その他の構成は第1の実施形態と同様である。したがって、第１の実施形態と共通する部分については、対応する箇所に同一の符号を付して重複する説明を省略する。

【００２８】

この実施形態の面１２には球状電極１４０の一部の表面が露出する球状電極露出孔１１２ｂが設けられる。球状電極露出孔１１２ｂは、開口１２ａを上下から挟みつつ穴１２ｃの配置方向に略直交するように略一直線状に並んで配置される。球状電極露出孔１１２ｂは、面１２の表面からハウジング１１０内部に向けて貫通する。

【００２９】

球状電極１４０は、被施術者の肌面に対して滑らかに転動する。球状電極１４０は、被施術者の皮膚に対して高周波電流を通電させる。球状電極１４０は、球状電極露出孔１１２ｂに設けられた図示はしない摺動電極と接触しており、常時印刷回路基板６０と電気的に接続される。

高周波美容処理装置２によれば、球状電極１４０が球状に形成されているので、球状電極１４０が被施術者の肌面上を転動する際の接触面積を小さくでき、被施術者の肌面に接触したときの、肌面に対するストレスをさらに低減することができる。そして、球状電極１４０によって、電気的刺激が局所的に集中すると共に押圧及び転動による物理的刺激が強くなり、第1の実施形態とは異なる美容効果を得ることができる。

【００３０】

［第３の実施形態］

次に図６を参照して、第３の実施形態について説明する。第３の実施形態に係る高周波美容処理装置３を示す斜視図である。図６に示すように、この実施形態は、固定電極５０及び開口１２ａに換えて伝熱端子２５０を面１２に配設し、伝熱端子２５０自体を加熱してヒータとして用いたものである。

また、この実施形態では、伝熱端子２５０の裏面側にヒータ２０が貼り付けられている

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。そして、温度計１７は、伝熱端子２５０の温度を測定する。
その他の構成は第１及び第２の実施形態と同様である。したがって、第１及び第２の実施形態と共通する部分については、対応する箇所に同一の符号を付して重複する説明を省略する。
この実施形態の面１２には、伝熱端子２５０の被施術者の肌面に当接される面が露出する穴２１２ｃが設けられる。

【００３１】

穴２１２ｃは、面１２においてローラ電極４０に挟まれて幅方向に並んで配置されている。
伝熱端子２５０は、例えば、かまぼこ型に成形された薄い金属板の内側にヒータ２０が配置されて構成されている。
したがって、ヒータ２０に給電することにより、伝熱端子２５０は内面から加熱され、加熱面が被施術者の皮膚面に当接されることによって、温熱による美容効果が発現される。なお、伝熱端子２５０に対する給電の制御は、第１及び第２の実施形態と同様である。

【００３２】

高周波美容処理装置３によれば、被施術者に対して、ヒータ２０によって暖められた伝熱端子２５０から供給される熱とローラ電極４０から供給される高周波電流によって、体の内部及び外部から同時に熱を与えることができる。

【００３３】

［その他の実施の形態］

以上、本発明の第１～第３の実施形態に係る高周波美容処理装置１～３について説明したが、本発明は上記の実施の形態にのみ限定されるものではなく、その要旨を逸脱しない範囲で種々の変更が可能である。
例えば、制御部６１は、施術者が何らかの異常を感じて高周波美容処理装置１を持つ手を動かした場合、ヒータ２０をＯＦＦに制御してもよい。この場合、個々のスイッチの操作をすることなく、ヒータ２０への給電が遮断され、ヒータ２０がＯＦＦに制御されるため、施術者は安心して処理を続けることができる。制御部６１は、この制御を加速度センサ６４ａからの検知信号を受信したことに対応して行う。

【００３４】

また、第１の実施形態の高周波美容処理装置１では、温度計１７によって検知されたヒータ２０の温度に基づいて、ヒータ２０への電圧のＯＮ・ＯＦＦを制御していた。これに換えて、印刷回路基板６０が時間を計時するタイマ部を備え、タイマの計時した時間に基づいてヒータ２０への電圧のＯＮ・ＯＦＦを制御するようにしてもよい。
この場合、図４のステップＳ１０１、Ｓ１０２において、高周波美容処理装置１の作動スイッチが押下されたことに対応して、制御部６１がヒータ２０への電力供給をＯＮに制御すると同時に、制御部６１がタイマ部に計時を開始させる。

【００３５】

そして所定時間（例えば２０秒）が経過したら制御部６１が、ヒータ２０への給電をＯＦＦに制御する。さらにヒータ２０への給電のＯＦＦ後に、制御部６１がタイマ部に再度計時を開始させ、所定時間経過後に再びヒータ２０への給電をＯＮに制御してもよい。この場合、高周波美容処理装置１の作動を停止させるスイッチが押下されるまで、タイマ部による計時に基づいたヒータ２０への給電のＯＮ・ＯＦＦの制御を繰り返えし行うことが望ましい。

【００３６】

さらなる変形例として、制御部６１がローラ電極４０及び固定電極５０への給電をＯＦＦに制御している場合には、ヒータ２０への給電をＯＮに制御し、制御部６１が検知信号を受信したことによって、ローラ電極４０及び固定電極５０への給電をＯＮに制御している場合には、ヒータ２０への給電をＯＦＦに制御するように構成することもできる。
このように、ローラ電極４０及び固定電極５０への給電のＯＮ・ＯＦＦの制御及びヒータ２０への給電のＯＮ・ＯＦＦの制御を交互に行うことにより、高周波電流とヒータ２０

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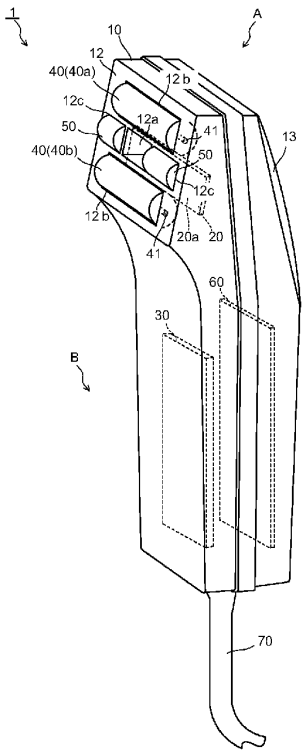
からの遠赤外線による熱の供給によって、皮膚が過剰に発熱してしまうことを防止できる。

【符号の説明】

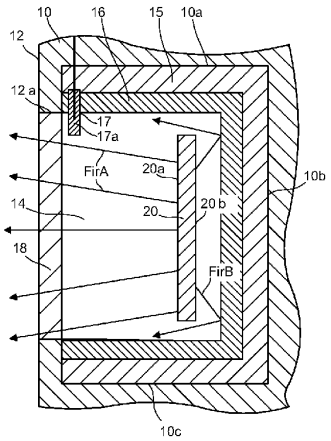
【００３７】

１～３…高周波美容処理装置、１０，１１０，２１０…ハウジング、１０ａ～１０ｃ…壁面、１２…面、１２ａ…開口、１２ｂ，１１２ｂ…穴、１２ｃ…穴、１３…操作面、１４…空間、１５…断熱層、１６…反射層、１７…温度計、検知部１７ａ、１８…遠赤外線透過窓、２０…ヒータ、２０ａ…主放熱面、２０ｂ…裏面、３０…二次電池、４０，１４０…ローラ電極、４１…回転軸、５０…固定電極、６０…印刷回路基板、６１…制御部、６３…ヒータ制御部、６４…センサ部、６４ａ…加速度センサ、７０…電源コード。

【図１】

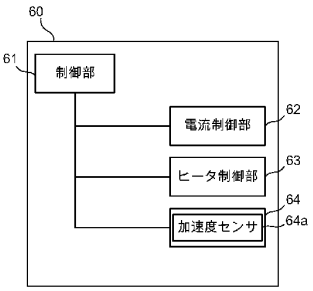


【図２】

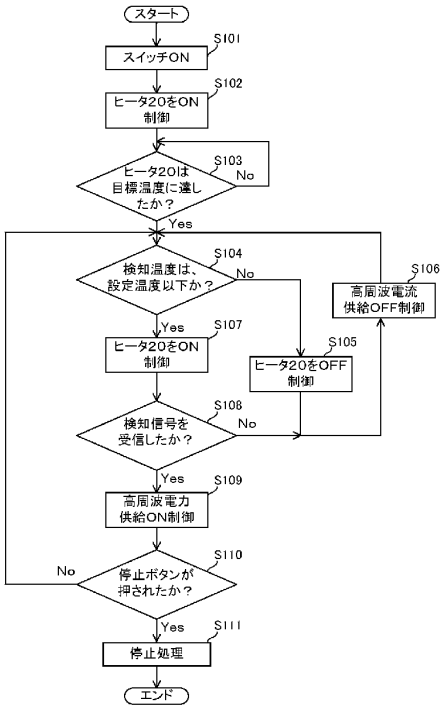


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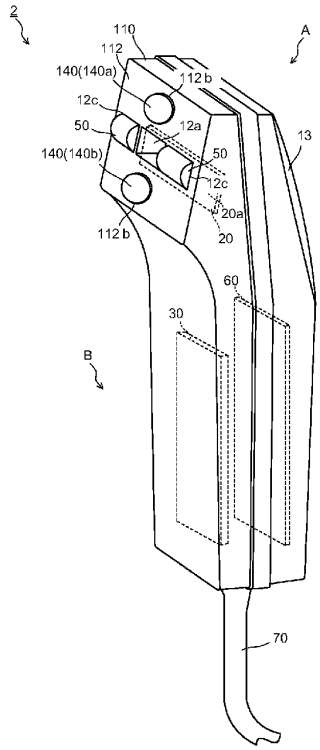
【図３】



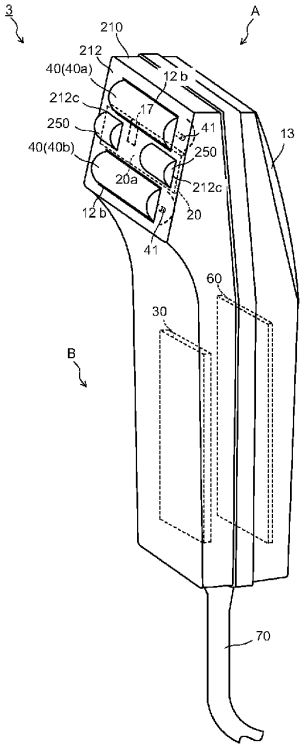
【図４】



【図５】



【図６】



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特開２０１１－０４１７０６（ＪＰ，Ａ）
特開２００７－２８９５６２（ＪＰ，Ａ）
米国特許出願公開第２００４／００７７９７７（ＵＳ，Ａ１）
特表２０１１－５１２２２７（ＪＰ，Ａ）
特開２００４－０８９２６１（ＪＰ，Ａ）
特開２００６－０６８３８１（ＪＰ，Ａ）
特開昭６３－１７４６７０（ＪＰ，Ａ）

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Ａ６１Ｈ　　７／００
Ａ６１Ｈ　２３／０２
Ｈ０５Ｂ　　３／００

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— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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WO 2013/118122 A1

(54) **Title**: LOW FREQUENCY VIBRATION EFFECTS

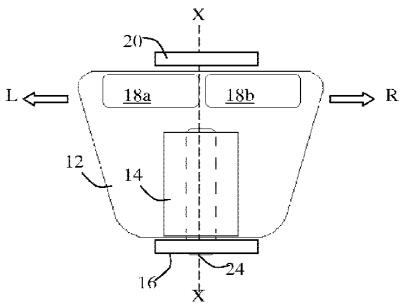


Fig. 2

(57) **Abstract**: A tactile transducer and a method of providing a personal experience to a person comprising providing a tactile transducer; coupling the tactile transducer to an anchor; providing a low frequency electrical signal to the tactile transducer, and inducing a movement in the anchor.

Petitioner Therabody Ex-1004, 0608

LOW FREQUENCY VIBRATION EFFECTS

The present invention claims benefit of USSN 61/596,260 and USSN 61/596,240, both filed on 8-FEB-12.

BACKGROUND

Animals sense vibrations, mostly via the ear. The human ear is able to sense vibrations over a wide range of frequencies as audible sound.

In the audible range, acoustic vibrations are experienced as sounds. Quality speakers are required for quality reproduction of music. To provide audible sensations in the low bass, very large speakers are required. Personal earphones are not effective in providing deep notes in the bass section of the audible spectrum i.e. in the range of < 250 Hz. The bass signals are only weakly picked up via the earphones, and this is one reason why people tend to listen to music via earphones at high volume, which is generally damaging to the ears. In a concert hall, some of the bass is sensed via the feet picking up vibrations of the floor, and the body sensing vibrations of the seat.

Similarly, to enable individuals to experience bass, for example, when listening to a DVD, an MP3, MP4 or smart-phone via earphones, mechanical vibrators may be attached to the body. Preferred locations are on acoustic meridians, such as near the sternum and the base of the spine, or on the legs or feet. This can provide sensations that are felt rather than heard, and which can provide or contribute to an immersive effect, particularly when provided with and synchronized with audible and visible sensations via earphones and screens. Thus, music, electronic games and movies may be enhanced by providing low frequency signals to the body.

Electromechanical vibrators that are capable of providing low frequency vibrations may comprise eccentric motors or pistons that consist of solenoid and magnets that are attracted and repelled by alternating currents in the solenoid.

In previously submitted patent applications, WO 2012/028973 "Personal Media Playing System" and WO 2012/029009 titled "A Wearable Vibration Device" a vibration device and its use for enhancing the experience of media was discussed.

The device was used for receiving low frequency electronic signals and for generating low frequency vibrations, particularly for enhancing the enjoyment of music, games and films to a wearer.

The present application discusses how related devices and appropriate signals may further enhance the user experience.

SUMMARY OF THE INVENTION

Petitioner Therabody Ex-1004, 0609

A first aspect of the invention is directed to a method of providing a personal experience to a person comprising the steps of:

providing a tactile transducer;

coupling the tactile transducer to an anchor, and

providing an ultra low frequency electrical signal to the vibrating transducer, and inducing a vibration in the anchor for sensing by the person.

Optionally the tactile transducer is worn, and is either attached to a garment or strapped to the body via the anchor.

Alternatively, the tactile transducer is attached to an interface selected from the group consisting of a seat, a platform, a joystick, a steering wheel, a handlebar and a wand.

In one embodiment, the tactile transducer comprises a closed loop of steel, a solenoid coupled to the closed loop and a magnetic array coupled to the closed loop opposite the solenoid and around the axis of the solenoid, such that changing electrical current in the solenoid causes the magnetic array to oscillate from side to side, tangential to the solenoid.

Where the ultra low frequency signal is a non symmetrical signal, the movement of the tactile transducer causes a tugging effect that provides a directional sensation.

In one embodiment, the closed loop of steel comprises S1010 steel and the magnets are niobium magnets.

In a preferred embodiment, the anchor for attachment to the person is coupled to the tactile transducer near to its center of mass.

Where the signal has a frequency of less than about 20 Hz, the transducer may provide a sensation of mood.

The sensation of mood may be selected from the group comprising anxiety, stress, spookiness and unease.

Typically, a person is exposed to audio or visual stimuli that are synchronized with the tactile frequency to reinforce the sensation of mood.

In some embodiments, the person is exposed to audio or visual stimuli that are spooky to provide a haunted sensation.

In one embodiment, the infrasonic signal is coupled with audible sound and / or images to provide a sensation of a natural phenomenon.

Petitioner Therabody Ex-1004, 0610

A second aspect is directed to providing a tactile transducer that comprises a closed loop of steel, a solenoid coupled to the closed loop and a magnetic array coupled to the closed loop, opposite the solenoid around the axis of the solenoid, such that an electrical signal in the solenoid causes the magnetic array to move sideways in a direction tangential to the solenoid.

In some embodiments, the tactile transducer further comprising a static element coupled to the closed loop near to near to a center of mass of the transducer such that the tactile transducer vibrates around the static element.

The tactile transducer may be configured such that a non-symmetrical low frequency electrical signal to the solenoid provides a directional tug.

A third aspect of the invention is directed to a mechanical interface for a gaming system comprising at least one tactile transducer for providing a player with a sensation, the tactile transducer comprising a closed loop of steel, a solenoid coupled to the closed loop, a magnetic array coupled to the closed loop opposite the solenoid and symmetrically arranged around the axis of the solenoid such that an electrical signal in the solenoid causes the magnetic array to move sideways in a direction tangential to the solenoid, where the stiffness of the loop prevents the magnets and solenoid from contacting.

Preferably a non symmetrical electrical signal provided to the mechanical interface provides a directional tug.

The directional tug may be selected from the group comprising an acceleration, a deceleration, a left turn, a right turn, an upwards pull, a downwards pull, a forwards pull and a backwards pull.

Preferably, a very low frequency vibration provided to the mechanical interface provides a sensation is a mood.

Optionally, the mechanical interface may be selected from the list comprising a platform, a joystick, a steering wheel and a wand.

The mechanical interface may enable playing an interactive game and may provide an immersive experience.

BRIEF DESCRIPTION OF FIGURES

For a better understanding of the invention and to show how it may be carried into effect, reference will now be made, purely by way of example, to the accompanying drawings.

Petitioner Therabody Ex-1004, 0611

With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only, and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention; the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice. In the accompanying drawings:

Fig. 1 is a flowchart of a method in accordance with one embodiment of the invention;

Fig. 2 is a schematic illustration of a tactile transducer in accordance with an embodiment of the invention;

Fig. 3 is a schematic illustration of a tactile transducer coupled via an anchor attached near the center of gravity, in accordance with another embodiment of the invention, and

Fig. 4 is a specific waveform designed for the transducer of Fig. 3 for providing a directional tug.

DESCRIPTION OF EMBODIMENTS

It is an object of preferred embodiments, to provide low frequency tactile sensations to a person.

In some embodiments, the tactile sensations are provided together with audible and visual sensations to provide an immersive experience.

Very low vibrations of below about 20 Hz, known as infrasound cannot be heard by the ears, or consciously detected but may be sensed subconsciously. There is a great deal of evidence that they are sensed by the body, and may be responsible for feelings of uneasiness or anxiety.

Earthquakes generate infrasound. Such low frequency vibrations have been found to provide feelings of anxiety and stress. Haunted houses and paranormal phenomena have been attributed to such low frequency vibrations.

Substantially sinusoidal infrasonic vibrations have been found to affect the mood of the person. Where such signals are provided together with appropriate audible and visual stimuli, specific feelings such as tension, uneasiness and anxiety are felt.

Petitioner Therabody Ex-1004, 0612

Appropriate low frequency signals may enhance the feeling of suspense when watching a movie scene depicting horror, suspense, or haunting, and provides an additional level of sensory perception to the audible and visual stimuli.

Earthquakes generate infrasound. Such low frequency vibrations have been found to provide feelings of anxiety and stress. Haunted houses and paranormal phenomena have been attributed to such low frequency vibrations.

Furthermore, it has surprisingly been found that a mechanical transducer comprising a solenoid coil coupled by a steel band to a magnetic array such that the magnets are arranged around the axis of the coil and separated slightly from the coil, is able to convert very low frequency electrical signals into a sideways movement of the magnetic array with respect to the the axis of the coil.

Where the transducer is attached to a person via a strap around a body part, such as a belt or necklace, or is attached via a clip to a person's garments, movement of the transducer is felt by the wearer.

It will be noted that such low frequency vibrations may be detected and felt through a single transducer. However, preferred embodiments may consist of a plurality of transducers that provide the same or slightly different signals to both wrists or to both feet or to a transducer on the back, with a second transducer on the chest, to reinforce the effect.

With reference to Fig. 1, a method of providing a personal experience to a person comprising the steps of: (a) providing a tactile transducer; (b) coupling the tactile transducer to an anchor; (c) providing an ultra low frequency electrical signal to the vibrating transducer, and (d) inducing a vibration in the anchor for sensing by the person.

With reference to Fig. 2, in one embodiment, the tactile transducer 10 comprises a closed loop of steel 12, a solenoid 14 coupled to the closed loop 12 at a proximal end stiffened with a proximal stiffening plate 16, and a magnetic array 18 coupled to the closed loop 12 attached a distal end that is stiffened with a distal plate 20 opposite the solenoid 14 symmetrically arranged around the axis X-X of the solenoid 14, such that changing electrical current in the solenoid 14 causes the magnetic array 18 to move from side to side L-R along a path that is substantially tangential to the axis X-X of the solenoid 14, the closed loop 12 of steel keeping the magnets 14 separated from the solenoid, but enabling them to vibrate from side to side.

Petitioner Therabody Ex-1004, 0613

In one embodiment, the magnetic array 16 comprises a pair of button magnets 18a, 18b arranged so in opposite orientation so that one magnet 18a is arranged South Seeking Pole facing towards the solenoid 14, and the other magnet 18b is arranged with the North Seeking Pole facing towards the solenoid 14. In this configuration, when an alternating current is passed through the wire around the solenoid 14, the end of the solenoid 14 facing the magnetic array 18 is alternately magnetized North seeking and South seeking (in accordance with the right hand grip rule). Where the upper face 15 is magnetized North seeking, the South seeking face of the magnet 18a is attracted and the north seeking face of the magnet 18b is repelled and the distal end of the transducer 10 is shifted to the right, the flexibility of the loop 12 enabling the side to side movement, but preventing the magnets from moving closer to or away from the solenoid 14. Conversely, when the upper face 15 is magnetized South seeking, the North seeking face of the magnet 18b is attracted and the South seeking face of the magnet 18a is repelled and the distal end of the transducer 10 is shifted to the left.

If the stem or anchor 22 of the transducer is attached to a garment or strapped to the body, the left and right shifts may be felt by the body through the anchor 22.

In one embodiment, the closed loop 12 comprises S1010 steel and the magnets 18 are niobium magnets. The stiffness and elasticity of the closed loop 12 serve to return the magnetic array 18 to its rest position, symmetrically arranged around the axis X-X of the solenoid 14.

Low frequency symmetrical waveforms such as sinusoidal waveforms are felt as low frequency vibrations. Where the signal has a frequency of less than about 20 Hz, the transducer may provide a sensation of mood.

Where the ultra low frequency signal is a non symmetrical signal, the movement of the tactile transducer 10 causes a tugging effect that provides a directional sensation. Thus non sinusoidal signals, such as that shown in Fig. 4 for example, or even a saw-tooth signal, can provide a directional movement to the transducer 10 that is felt as a tug.

With reference to Fig. 3, in a preferred embodiment, the anchor 24 is coupled to the tactile transducer 100 near to its center of mass, for example, by a non-conducting clamp 26 attached to the solenoid 14.

By attaching the anchor 24 to a central position, the directional tug created by non-symmetrical waveforms is enhanced.

Petitioner Therabody Ex-1004, 0614

In some embodiments, the tactile transducer 100 is worn on the body and provides a tactile sensation directly to the body. This is particularly effective for low frequency mood inducing sensations.

Alternatively, the tactile transducer is attached to an interface such as a seat, or to a control interface for a game console such as Nintendo's Wii, Microsoft's Xbox 360 or Sony's PlayStation 3. The control interface may be a joystick for general purpose game playing, a steering wheel or a handlebar for controlling a car or bike, a wand for playing magical fantasy games, or a platform for sensing body movements for simulating hula-hooping, skiing and similar applications.

For example, a transducer 10 (100) of the invention may be coupled to a steering wheel used for steering a vehicle in a computer game. The transducer may provide the player with a resistance to turning that can be synchronized with the virtual topography of the terrain being navigated across to provide the player with a feeling of centrifugal force, for example.

Similarly, a transducer may be attached to the handlebars of a motorbike or a water-bike of an arcade game to provide turning resistance. One or more transducers may be coupled to the footrests and / or seat of a motorbike or waterbike in an electronic arcade video game, to provide both low frequency vibrations that provide a feeling of sitting astride a powerful motor, and superimposed vibrations that are indicative of the terrain.

By providing a plurality of tactile transducers arranged at different orientations, accelerations, decelerations, left and right turns, upwards pulls, downwards pulls, forwards and backwards pulls may be created.

Furthermore, very low vibrations of below about 20 Hz, known as infrasound cannot be heard by the ears, or consciously detected but may be sensed subconsciously. There is a great deal of evidence that they are sensed by the body, and may be responsible for feelings of uneasiness or anxiety, stress, spookiness or general unease.

The transducer, whether attached to the body or to a wand, console or seat, may provide low frequency vibrations that create or enhance a mood. If the person is also exposed to audio or visual stimuli through sounds and images that are synchronized with the tactile frequency, the sensation of mood is enhanced.

For example, in a movie or game, a player may be exposed to audio or visual stimuli and to infrasonic vibrations to provide a haunted sensation.

Petitioner Therabody Ex-1004, 0615

For fantasy applications, this can provide a very good immersive experience, enhancing magical experiences, for example.

There are also natural phenomena that include infrasonic vibrations. These include glaciers calving icebergs, for example. It will be noted that a tiger's roar includes subsonic vibrations of about 18 Hz, which contribute to the menacing sensation that the roar induces. It will be appreciated that an infrasonic signal may be coupled with audible sound and / or images to provide an enhanced sensation of such natural phenomena and an improved immersive experience.

It will be appreciated that for movies and game applications, the tactile sensor of the invention may be combined with images projected onto a screen, onto special spectacles or onto the retina of the person, and with sounds generated via earphones or speakers. The tactile sensor may be provided as part of a console, smartphone, and the like, together with accelerometers and other tactile sensors.

The applications of low frequency and directed vibrations are not only for entertainment. It will be appreciated that low frequency vibrations to specific body parts may also provide therapeutic effects. The application of non-symmetrical signals may provide a directional stimulus that can provide a feeling or well being, and may stimulate blood circulation, relieve muscle cramps and have other beneficial effects.

With reference to Fig. 4, an exemplary waveform for giving a directional effect to the transducer of Fig. 3 is shown. The structure of the signal is a combination of an attack signal which is a 200Hz sine wave with a sustain, decay & release signal that has a frequency of 50Hz. The amplitude of the wave is +4dB, and the release of the signal ends at a single strength of -22dB. It will be appreciated that this wave has been developed for a specific transducer as shown in Fig. 3, and variations in the various parameters such as the number of coils of the solenoid, the size and strength of the magnets, the coefficient of elasticity and the dimensions of the band of steel 12, can all affect the shape of the optimum signal.

To understand how the signal of Fig. 4 interacts with the sensor 10 (100) of the invention, a series of simpler waves are now explained.

With reference to Fig. 5, a saw-toothed wave form is shown. Saw toothed wave causes a sharp tug towards the left. The decay to the right takes 6 times as long and is therefore not really felt.

Petitioner Therabody Ex-1004, 0616

With reference to Fig. 6, a series of saw-toothed waveforms of Fig. 5, with gradually increasing amplitudes, provides a continuous pulling to the left, instead of a sharp tug.

Fig. 7 shows a series of saw toothed waveforms as with Fig. 6, that provides a smooth pull to the left, followed by a second series of saw-toothed waveforms having a sharp rise to the right, followed by a relatively long decay. The sensor receiving the waveform of Fig. 7 experiences a smooth pulling to the left, followed by a smooth pulling to the right.

Several embodiments of the present invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other embodiments are within the scope of the following claims.

Thus persons skilled in the art will appreciate that the present invention is not limited to what has been particularly shown and described hereinabove. Rather the scope of the present invention is defined by the appended claims and includes both combinations and sub combinations of the various features described hereinabove as well as variations and modifications thereof, which would occur to persons skilled in the art upon reading the foregoing description.

In the claims, the word "comprise", and variations thereof such as "comprises", "comprising" and the like indicate that the components listed are included, but not generally to the exclusion of other components.

Petitioner Therabody Ex-1004, 0617

CLAIMS

1. A method of providing a personal experience to a person comprising providing a tactile transducer;
coupling the tactile transducer to an anchor;
providing a low frequency electrical signal to the tactile transducer, and inducing a movement in the anchor.

2. The method of claim 1 wherein the low frequency is an ultra low frequency.

3. The method of claim 1, wherein the tactile transducer comprises a closed loop of flexible material, a solenoid coupled to the closed loop and a magnetic array coupled to the closed loop, opposite the solenoid around the axis of the solenoid, such that a changing electrical current in the solenoid causes the magnetic array to oscillate from side to side, tangential to the solenoid.

4. The method of claim 3, such that a non symmetrical signal causes a directional sensation.

5. The method of claim 3, wherein the closed loop comprises steel.

6. The method of claim 5, wherein the closed loop of steel comprises S1010 steel.

7. The method of claim 1, wherein the anchor is coupled to the tactile transducer near to its center of mass.

8. The method of claim 1, wherein the anchor is attached to a person via a clip to a garment or a strap attached to the person.

Petitioner Therabody Ex-1004, 0618

9. The method of claim 1, wherein the anchor is attached to a control interface for controlling a game.

10. The method of claim 9, wherein the control interface is selected from the group comprising, handlebars, steering wheels, joysticks and gun butts.

11. The method of claim 1, wherein providing a signal having a frequency of less than about 20 Hz provides a sensation of mood.

12. The method of claim 11 wherein the sensation of mood is selected from the group comprising anxiety, stress, spookiness and unease.

13. The method of claim 11, wherein said person is exposed to audio or visual stimuli that are synchronized with the frequency to reinforce the sensation of mood.

14. The method of claim 11, wherein said person is exposed to audio or visual stimuli that are spooky to provide a haunted sensation.

15. The method of claim 11, wherein infrasonic signals are coupled with audible sounds and visual images of a natural phenomenon to provide an enhanced sensation of the natural phenomenon.

16. A tactile transducer comprises a closed loop of flexible material, a solenoid coupled to the closed loop and a magnetic array coupled to the closed loop, opposite the solenoid around the axis of the solenoid, such that an electrical signal in the solenoid causes the magnetic array to move sideways in a direction tangential to the solenoid.

17. The tactile transducer of claim 16, wherein said flexible material is steel.

Petitioner Therabody Ex-1004, 0619

18. The tactile transducer of claim 16, further comprising a static element coupled to the closed loop near to a center of mass of the transducer such that the tactile transducer vibrates around the static element.

19. The tactile transducer of claim 16 configured such that a non-symmetrical low frequency electrical signal to the solenoid provides a directional tug.

20. A mechanical interface for a gaming system comprising at least one tactile transducer of claim 11 for providing a player with a sensation.

21. The mechanical interface of claim 20, wherein a non symmetrical electrical signal to the mechanical interface provides a directional tug.

22. The mechanical interface of claim 20, wherein said signal is a very low frequency vibration and said sensation is a mood.

23. The mechanical interface of claim 20, wherein the directional tug is selected from the group comprising an acceleration, a deceleration, a left furn, a right turn, an upwards pull, a downwards pull, a forwards pull and a backwards pull.

24. The mechanical interface of claim 20 selected from the list comprising a platform, a joystick, a steering wheel and a wand.

25. The mechanical interface of claim 20 for playing an interactive game.

26. The mechanical interface of claim 20 for providing an immersive experience.

Petitioner Therabody Ex-1004, 0620

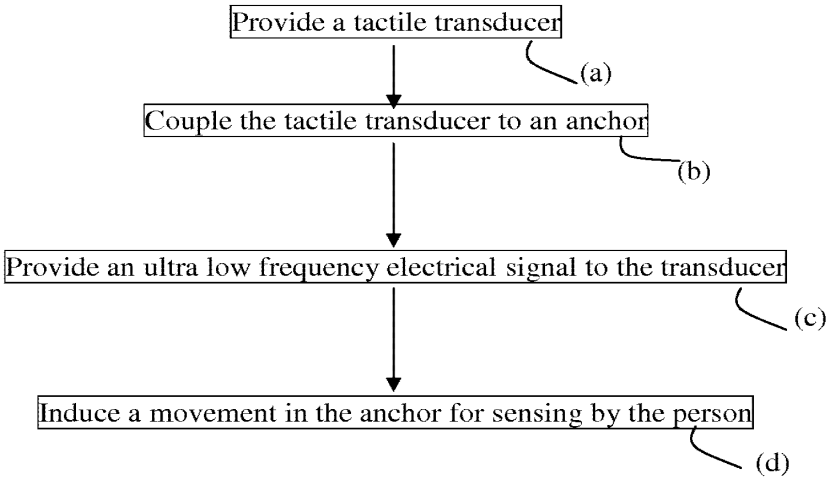

Provide a tactile transducer
(a)
Couple the tactile transducer to an anchor
(b)
Provide an ultra low frequency electrical signal to the transducer
(c)
Induce a movement in the anchor for sensing by the person
(d)

Fig. 1

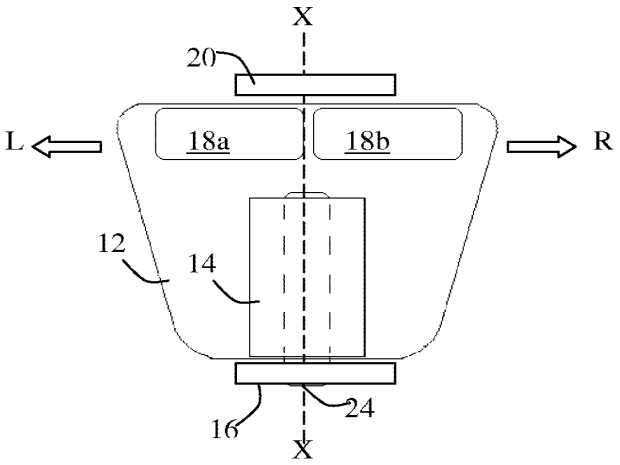

X
20
L
18a
18b
R
12
14
24
16
X

Fig. 2

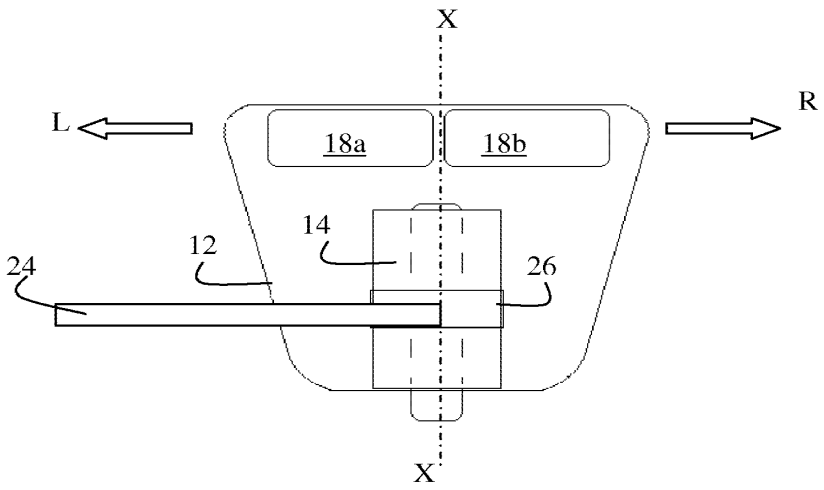


Fig. 3

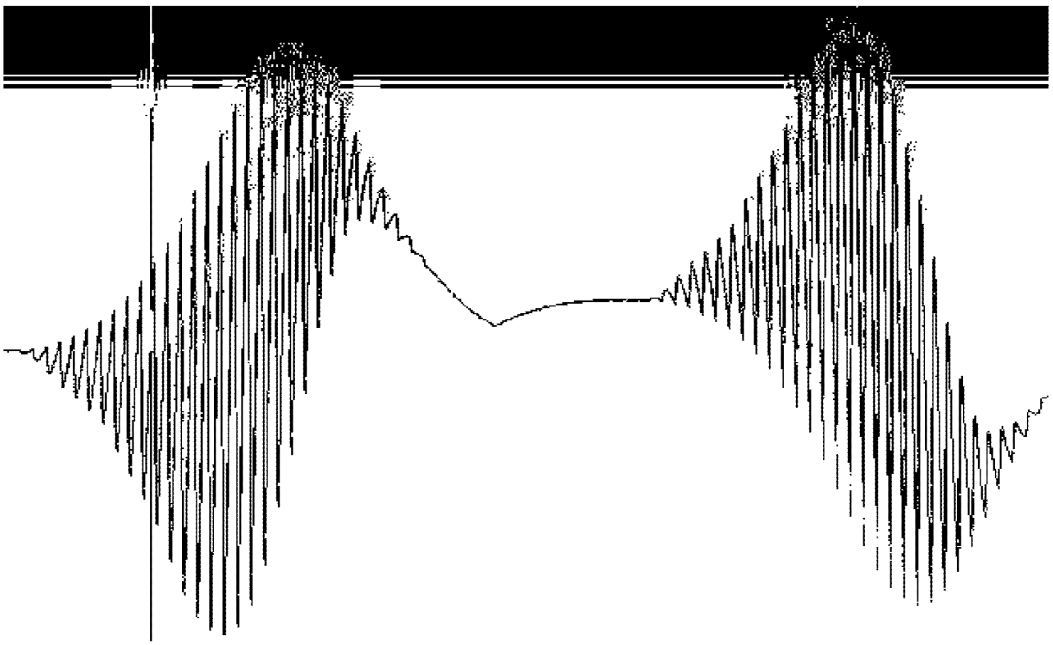


Fig. 4

Petitioner Therabody Ex-1004, 0622

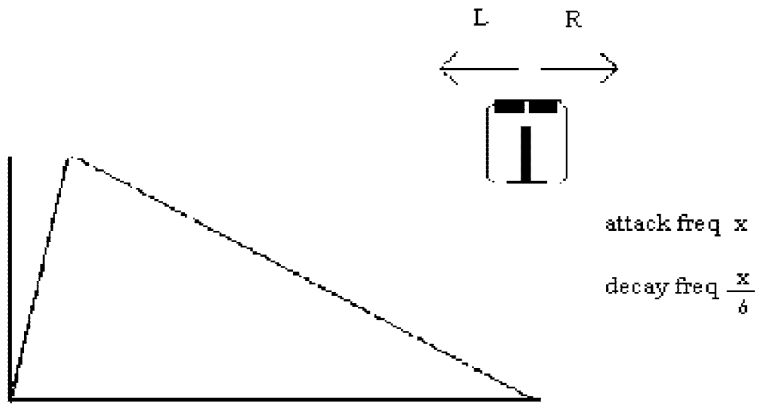


Fig. 5

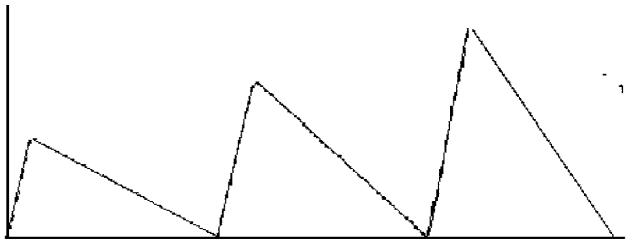


Fig. 6

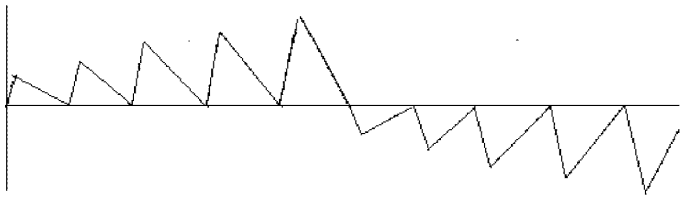


Fig. 7

Petitioner Therabody Ex-1004, 0623

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2013/050114

A. CLASSIFICATION OF SUBJECT MATTER
IPC (2013.01) B06B 1/00, A63F 13/02, G06F 3/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (2013.01) B06B 1/00, A63F 13/02, G06F 3/01

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Databases consulted: THOMSON INNOVATION, Esp@cenet, Google Patents
Search terms used: tactile, transducer, sensation, solenoid, coil, magnets, loop, low frequency, vibration, movement, clip, strap

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011190058 A1 Houston et al. 04 Aug 2011 (2011/08/04) Paragraphs 9-11, 116, 184, 211, 215, 255, Claims	1,2,4-15,17
X	US 6982696 B1 Shahoian 03 Jan 2006 (2006/01/03) Columns 1, 2, 6, Fig. 2	3,4,16,18-26
X	US 2011169347 A1 Miyamoto et al. 14 Jul 2011 (2011/07/14) Fig. 6	16
A	JP 2003024871 A NIDEC COPAL CORP 28 Jan 2003 (2003/01/28) Abstract	1-26

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 May 2013	21 May 2013
Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616	Authorized officer GORBONOVA Yelena Telephone No. 972-2-5651669

Form PCT/ISA/210 (second sheet) (July 2009)

Petitioner Therabody Ex-1004, 0624

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IL2013/050114

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
US 2011190058 A1	04 Aug 2011	AT 516864 T	15 Aug 2011
		EP 1907086 A2	09 Apr 2008
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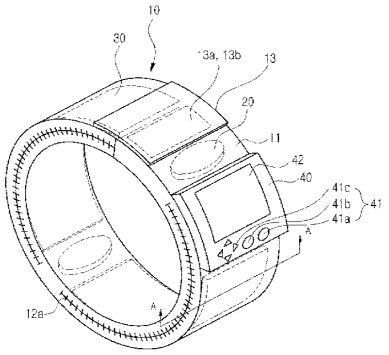
(54) 발명의 명칭 **탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드**

(57) 요 약

본 발명은 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드에 관한 것으로, 시간과 장소에 관계없이 휴대하면서 간단하게 진동 압박 및 한랭 또는 온열 자극할 수 있게 하기 위한 것이다.

이를 위하여 본 발명은 팔이나 다리 또는 관절 부위를 둘러 감쌀 수 있는 길이의 탄성을 가진 밴드로 이루어지며 밴드의 몸체 내부에 진동 자극을 위한 진동 자극부와 한랭/온열 자극을 위한 온도변화 자극부가 내장되는 밴드 본체, 진동 자극 또는 한랭/온열 자극에 대한 동작/정지 명령을 입력하기 위한 키입력부와 진동 자극부 및 온도변화 자극부로 동작 전원을 공급하기 위한 전원부를 일체로 구비하여 밴드 본체에 장착되며 키입력에 따라 전원부의 동작을 제어하여 밴드 본체에서의 진동 자극부와 온도변화 자극부의 동작을 제어하는 제어장치부를 포함하는 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드를 제공하여, 탄성 압박 밴드에 의한 압박 자극 및 진동 모터에 의한 진동 자극과 함께 온열 자극 또는 한랭 자극을 팔이나 다리 또는 관절 부위의 둘레에 시간과 장소에 관계없이 휴대하면서 이동시에도 지속적으로 사용할 수 있게 되는 이점이 있다.

대 표 도 - 도1



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특허청구의 범위

청구항 1

링 형상 또는 일자 형상으로 탄성을 가진 밴드로 이루어지며, 상기 밴드의 몸체 내부에 다수개의 진동자가 내장되고 압박 패드를 팔이나 다리 또는 관절 부위에 둘러 감싸는 경우 부위별 진동 자극을 위한 진동자극부와 냉/온열 자극을 위한 온도변화 자극부가 내장되며, 그 몸체의 일측면이 길이방향을 따라 개방되어 수납공간을 개방하며, 그 개방 단부에 지퍼가 부착되어 상기 지퍼의 개폐를 통해 상기 수납공간을 필요에 따라 개폐 가능하도록 구성하며, 제1 벨크로테이프에 대응하는 제2벨트로테이프의 결합을 통해 팔, 다리 또는 관절 부위에 따라 탈부착이 가능한 밴드 본체;

진동 자극 또는 한랭/온열 자극에 대한 동작/정지 명령을 입력하기 위한 키입력부와 상기 진동 자극부 및 온도변화 자극부로 동작 전원을 공급하기 위한 전원부를 일체로 구비하여 상기 밴드 본체에 장착되며, 키입력에 따라 상기 전원부의 동작을 제어하여 상기 밴드 본체에서의 상기 진동 자극부와 온도변화 자극부의 동작을 제어하는 제어장치부;를 포함하고,

상기 밴드 본체는, 그 몸체의 내부에 길이방향으로 수납공간이 형성되며, 한랭/온열 자극을 위한 상기 온도변화 자극부가 그 내부에 수납되어 장착되며, 상기 온도변화 자극부는, 전원이 공급되면 온찜질을 위해 일정범위 내의 온도에서 열을 방출하여 피부 접촉 부위에 온열 자극을 인가하는 온열 자극부 및 접촉면 주변의 피부로부터 열을 흡수하여 피부 접촉부위에 한랭 자극을 인가하는 한랭 자극부를 포함하고,

온열 자극에 의한 치료를 필요로 하는 환자나 환부에는 탈착식 한랭 자극부를 제거하여 온열 자극장치로 사용하고, 온열 자극에 의한 치료가 금기시 되는 환부에는 선택적으로 탈착식 한랭 자극부를 부착하여 한랭 자극장치로 사용하게 되므로, 밴드에 의한 압박 자극 및 진동 모터에 의한 진동 자극과 함께 온열 자극 또는 한랭 자극을 팔이나 다리 또는 관절 부위의 실시하는 것을 특징으로 하는 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드.

청구항 2

삭제

청구항 3

삭제

청구항 4

삭제

청구항 5

삭제

청구항 6

제1항에 있어서,

상기 온열 자극부는,

하이 카본 또는 면상 발열체 중의 어느 하나로 구성되는 것을 특징으로 하는 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드.

청구항 7

제1항에 있어서,

상기 한랭 자극부는,

젤 형태의 냉매를 팩의 내부에 수납 및 밀봉시켜 이루어지는 젤 팩으로 구성되며, 상기 온열 자극부의 내부에

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탈부착 가능하게 수납되는 것을 특징으로 하는 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드.

청구항 8

삭제

청구항 9

삭제

청구항 10

삭제

청구항 11

삭제

명 세 서

기 술 분 야

[0001] 본 발명은 한랭/온열 및 진동 자극이 가능한 휴대용 복합 밴드에 관한 것으로서, 보다 상세하게는 탄성을 갖는 밴드를 이용하여 팔이나 다리 또는 관절 부위에 시간과 장소에 관계없이 휴대하면서 이동시에도 탄성 압박 밴드에 의한 압박 자극 및 진동 모터에 의한 진동 자극과 함께 온열 자극 또는 한랭 자극을 동시에 인가할 수 있으며 간단히 휴대할 수 있도록 하여 시간과 장소에 관계없이 이동 중에도 편리하게 사용할 수 있는 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드에 관한 것이다.

배 경 기 술

[0002] 일반적으로, 한의학에서는 경혈 부위에 침을 꽂아 자극하는 침자극 방식으로 병을 예방하거나 치료하는 시술방법이 사용되며, 최근에는 특히 비침습적인 방법으로 뜸에서 발생되는 열에 의한 자극을 병행하여 시술함으로써 치료 효과를 높여주는 온열 자극에 의한 치료요법이 사용되고 있다. 특히 혈행이 없는 팔이나 다리 또는 관절과 같은 곳에서 발생되는 관절염과 같은 질환에 온열 자극을 가하는 치료요법이 선택적으로 사용되고 있다.

[0003] 그러나 이러한 침이나 뜸은 자격을 갖춘 전문가에 의해 한정적으로 시술되어져야 하므로 일반인들이 침구치료를 받기 위해서는 별도의 시간과 비용을 투자해야하는 번거로움이 있었다.

[0004] 또한, 이러한 침이나 뜸은 일반인에게 두려움을 주기 때문에 치료를 기피하는 경향이 있으며, 치료에 많은 시간이 소요될 뿐만 아니라 치료 도중에는 환자의 움직임이 제한됨에 따라 불편함이 가중되고 일상 활동을 중단해야 하는 문제가 있었다.

[0005] 따라서, 자격을 갖춘 전문가나 의료기관에서 치료받는 것 외의 보조적인 치료를 위해 각 개인이 간편하게 휴대하면서 시간과 장소에 관계없이 지속적으로 경혈이나 환부를 자극할 수 있는 휴대용 자극장치의 개발이 요구되고 있다.

[0006] 대한민국 특허등록 제10-0735855호(명칭: 성인병 예방용 휴대용 전기 뜸 밴드)에는 착용 및 휴대가 간편하면서도 동시에 인체의 경혈(經穴) 자리를 침이나 뜸 대신 쉽고 편리하게 전기 온열자극 및 압박진동에 의한 자극을 인가할 수 있는 휴대용 전기뜸 패드가 공지되어 있다.

[0007] 그러나 상기의 종래 기술에서는 뜸을 대신하여 전기에 의한 온열 자극과 착용 밴드에 의한 압박 자극, 및 진동 모터에 의한 진동 자극이 환부 또는 경혈에 인가되도록 구성되어 있으므로, 실질적으로 한랭 자극을 필요로 하는 환부에는 사용하기 어려운 문제점이 있었다.

[0008] 한편, 감각(특히 온각)이 저하된 부위나 환자는 화상이나 동상의 위험이 있으므로 온열 자극에 의한 치료는 금기이며 혈액 순환이 저하된 부위나 환자는 온도 상승에 대해 혈류 공급이 증가되지 않아 온도상승 및 화상의 위험이 크고 증가된 세포의 대사 작용을 지원할 수 없어 주의해야 한다. 또한 최근에 출혈이 있었던 부위나 출혈의 위험이 큰 부위는 혈관 확장 및 혈류 증가로 인하여 출혈의 위험도가 증가하게 되므로 온열 자극에 의한 치료는 금기시 되고 있다. 또한 급성 염증이나 외상 및 부종이 있는 부위는 염증이나 부종을 오히려 증가시키므로 온열 자극에 의한 치료는 금기이며, 각종 세균의 감염이 의심되는 부위 또는 피부 위축이나 반흔이 있는 부위도

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화상이나 피부 손상의 가능성이 높으므로 주의하여야 한다.

[0009] 온열 자극에 의한 치료의 반대개념인 한랭 자극에 의한 치료는 대부분 전도에 의해 열에너지를 환부에 전달하는 것으로, 얼음마사지, 냉수포, 냉공기요법(cold air), 기화냉각스프레이(vaporcoolant spray), 냉욕조 등 다양한 형태가 있으며, 오래전부터 경험에 의하여 근골격계 외상 후 부종과 출혈을 감소시키고 통증을 감소시킬 목적이나 신경 근육 장애의 치료에 보조적인 도구로 사용되어 왔다.

[0010] 따라서 최근에는 실질적으로 한랭 자극 또는 온열 자극을 필요로 하는 환부에 선택적으로 사용할 수 있으면서도 착용 밴드에 의한 압박 자극, 및 진동 모터에 의한 진동 자극이 팔이나 다리 또는 관절 등에 동시에 인가될 수 있는 치료 도구의 개발이 요구되고 있다.

발명의 내용

해결하려는 과제

[0011] 본 발명이 해결하고자 하는 기술적 과제는, 탄성을 갖는 밴드를 이용하여 팔이나 다리 또는 관절 부위를 간단하고 편리하게 한랭 자극이나 온열 자극을 선택적으로 사용할 수 있으면서도 압박과 진동에 의한 자극이 동시에 가능하며 간단히 휴대할 수 있도록 하여 장소에 관계없이 이동 중에도 편리하게 사용할 수 있는 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드를 제공하고자 하는 것이다.

과제의 해결 수단

[0012] 상기 목적을 달성하기 위한 본 발명은, 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드는 링 형상 또는 일자 형상으로 탄성을 가진 밴드로 이루어지며, 상기 밴드의 몸체 내부에 다수개의 진동자가 내장되고 압박패드를 팔이나 다리 또는 관절 부위에 둘러 감싸는 경우 부위별 진동 자극을 위한 진동자극부와 냉/온열 자극을 위한 온도변화 자극부가 내장되며, 그 몸체의 일측면이 길이방향을 따라 개방되어 수납공간을 개방하며, 그 개방 단부에 지퍼가 부착되어 상기 지퍼의 개폐를 통해 상기 수납공간을 필요에 따라 개폐 가능하도록 구성하며, 제1 벨크로테이프에 대응하는 제2벨트로테이프의 결합을 통해 팔, 다리 또는 관절 부위에 따라 탈부착이 가능한 밴드 본체; 및 진동 자극 또는 한랭/온열 자극에 대한 동작/정지 명령을 입력하기 위한 키입력부와 상기 진동 자극부 및 온도변화 자극부로 동작 전원을 공급하기 위한 전원부를 일체로 구비하여 상기 밴드 본체에 장착되며, 키입력에 따라 상기 전원부의 동작을 제어하여 상기 밴드 본체에서의 상기 진동 자극부와 온도변화 자극부의 동작을 제어하는 제어장치부;를 포함하고, 상기 밴드 본체는, 그 몸체의 내부에 길이방향으로 수납공간이 형성되며, 한랭/온열 자극을 위한 상기 온도변화 자극부가 그 내부에 수납되어 장착되며, 상기 온도변화 자극부는, 전원이 공급되면 온찜질을 위해 일정범위 내의 온도에서 열을 방출하여 피부 접촉 부위에 온열 자극을 인가하는 온열 자극부 및 접촉면 주변의 피부로부터 열을 흡수하여 피부 접촉부위에 한랭 자극을 인가하는 한랭 자극부를 포함하고, 온열 자극에 의한 치료를 필요로 하는 환자나 환부에는 탈착식 한랭 자극부를 제거하여 온열 자극장치로 사용하고, 온열 자극에 의한 치료가 금기시 되는 환부에는 선택적으로 탈착식 한랭 자극부를 부착하여 한랭 자극장치로 사용하게 되므로, 밴드에 의한 압박 자극 및 진동 모터에 의한 진동 자극과 함께 온열 자극 또는 한랭 자극을 팔이나 다리 또는 관절 부위의 실시하는 것을 특징으로 한다.

[0013] 삭제

[0014] 삭제

[0015] 또, 상기 진동 자극부는, 다수 개로 이루어지며, 상기 압박 패드를 팔이나 다리 또는 관절 부위에 둘러 감싸는 경우 부위별 진동이 가능하도록 상기 밴드 본체에 길이방향을 따라 일정 간격만큼 복수로 내장될 수 있다.

[0016] 삭제

[0017] 또, 상기 온도변화 자극부는, 다수 개로 구분되어 상기 진동 자극부 사이의 상기 밴드의 몸체 내부에 내장되어

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설치되며, 상기 밴드의 몸체의 길이방향으로 배치될 수 있다.

[0018] 삭제

[0019] 또, 상기 온도변화 자극부는, 주변으로 열을 방출하여 피부 접촉 부위에 온열 자극을 인가하는 온열 자극부로 구성될 수 있다.

[0020] 삭제

[0021] 또, 상기 온도변화 자극부는, 주변으로부터 열을 흡수하여 피부 접촉부위에 한랭 자극을 인가하는 한랭 자극부;를 더 포함할 수 있다.

[0022] 삭제

[0023] 또, 상기 온열 자극부는, 하이 카본 또는 면상 발열체 중의 어느 하나로 구성될 수 있다.

[0024] 삭제

[0025] 또, 상기 한랭 자극부는, 젤 형태의 냉매를 팩의 내부에 수납 및 밀봉시켜 이루어지는 젤 팩으로 구성되며, 상기 온열 자극부의 내부에 탈부착 가능하게 수납될 수 있다.

[0026] 삭제

[0027] 또, 상기 밴드 본체는, 그 몸체의 내부에 길이방향으로 수납공간이 형성되며, 한랭/온열 자극을 위한 온도변화 자극부가 그 내부에 수납되어 장착될 수 있다.

[0028] 삭제

[0029] 또, 상기 밴드 본체는, 그 몸체의 일측면이 길이방향을 따라 개방되어 상기 수납공간을 개방하며, 그 개방 단부에 지퍼가 부착되어 상기 지퍼의 개폐를 통해 상기 수납공간을 필요에 따라 개폐 가능하도록 구성될 수 있다.

[0030] 삭제

[0031] 또, 상기 밴드 본체는, 링 형태로 형성될 수 있다.

[0032] 삭제

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[0033] 또, 상기 밴드 본체는, 일자형으로 형성되며, 그 일측 단부에 탈부착을 위한 제1벨크로테이프가 부착되고 다른 측 단부에 상기 제1 벨크로테이프에 대응하는 제2벨트로테이프가 부착될 수 있다.

[0034] 삭제

발명의 효과

[0035] 본 발명에 따른 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드에 의하면, 온열 자극에 의한 치료를 필요로 하는 환자나 환부에는 탈착식 한랭 자극부를 제거하여 온열 자극장치로 사용할 수 있게 되고, 온열 자극에 의한 치료가 금기시 되는 환부에는 선택적으로 탈착식 한랭 자극부를 부착하여 한랭 자극장치로 사용할 수 있게 되므로, 밴드에 의한 압박 자극 및 진동 모터에 의한 진동 자극과 함께 온열 자극 또는 한랭 자극을 팔이나 다리 또는 관절 부위의 둘레에 시간과 장소에 관계없이 휴대하면서 이동시에도 지속적으로 사용할 수 있게 되는 이점이 있다.

도면의 간단한 설명

[0036] 도 1은 본 발명의 일 실시예에 따른 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드의 전체적인 구성을 개략적으로 도시한 사시도이다.

도 2는 도 1의 휴대용 열/진동 복합 자극패드를 펼친 상태를 예시한 평면도이다.

도 3과 도 4는 도 1의 A-A' 선 단면 확대도이다.

발명을 실시하기 위한 구체적인 내용

[0037] 이하, 본 발명의 일 실시 형태에 의한 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드의 구성 및 동작을 첨부 도면을 참조하여 상세히 설명한다.

[0038] 본 명세서 및 청구범위에 사용된 용어나 단어는 통상적이거나 사전적인 의미로 한정 해석되지 아니하며, 발명자는 그 자신의 발명을 가장 최선의 방법으로 설명하기 위해 용어의 개념을 적절하게 정의할 수 있다는 원칙에 입각하여 본 발명의 기술적 사상에 부합하는 의미와 개념으로 해석되어야만 한다. 따라서, 본 명세서에 기재된 실시예와 도면에 도시된 구성은 본 발명의 가장 바람직한 일 실시예에 불과할 뿐이므로, 본 출원시점에 있어서 이들을 대체할 수 있는 다양한 균등물과 변형예들이 있을 수 있음을 이해하여야 한다.

[0039] 도 1은 본 발명의 일 실시예에 따른 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드의 전체적인 구성을 개략적으로 도시한 사시도이고, 도 2는 도 1의 휴대용 열/진동 복합 자극패드의 내부 구조를 설명하기 위하여 자극패드를 펼쳐 예시한 평면도이고 도 3과 도 4는 도 1의 A-A' 선 단면 확대도로서, 도 3은 온열 자극부(31)가 수납 공간(12)의 상, 하부에 모두 설치된 상태의 실시 예도이고 도 4는 온열 자극부(31)가 수납 공간(12)의 상, 하부 중에서 한쪽에만 설치된 상태의 실시 예도이다.

[0040] 도 1 내지 도 4에 도시된 바와 같이 본 발명의 일 실시 형태에 따른 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드는 밴드 본체(10)와 제어장치부(40)를 포함하여 구성된다.

본 발명의 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드는 링 형상 또는 일자 형상으로 탄성을 가진 밴드로 이루어지며, 상기 밴드의 몸체 내부에 다수개의 진동자가 내장되고 압박 패드를 팔이나 다리 또는 관절 부위에 둘러 감싸는 경우 부위별 진동 자극을 위한 진동자극부와 냉/온열 자극을 위한 온도변화 자극부가 내장되며, 그 몸체의 일측면이 길이방향을 따라 개방되어 수납공간을 개방하며, 그 개방 단부에 지퍼가 부착되어 상기 지퍼의 개폐를 통해 상기 수납공간을 필요에 따라 개폐 가능하도록 구성하며, 제1 벨크로테이프에 대응하는 제2벨트로테이프의 결합을 통해 팔, 다리 또는 관절 부위에 따라 탈부착이 가능한 밴드 본체(10); 및 진동 자극 또는 한랭/온열 자극에 대한 동작/정지 명령을 입력하기 위한 키입력부와 상기 진동 자극부 및 온도변화 자극부로 동작 전원을 공급하기 위한 전원부를 일체로 구비하여 상기 밴드 본체(10)에 장착되며, 키입력에 따라 상기 전원부의 동작을 제어하여 상기 밴드 본체(10)에서의 상기 진동 자극부와 온도변화 자극부의 동작을 제어하는 제어장치부(40);를 포함하고, 상기 밴드 본체(10)는, 그 몸체의 내부에 길이방향으로 수납공간이 형성되며, 한랭/온열 자극을 위한 상기 온도변화 자극부가 그 내부에 수납되어 장착되며, 상기 온도변화 자극부

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는, 전원이 공급되면 온찜질을 위해 일정범위 내의 온도에서 열을 방출하여 피부 접촉 부위에 온열 자극을 인가하는 온열 자극부 및/또는 접촉면 주변의 피부로부터 열을 흡수하여 피부 접촉부위에 한랭 자극을 인가하는 한랭 자극부를 포함학, 온열 자극에 의한 치료를 필요로 하는 환자나 환부에는 탈착식 한랭 자극부를 제거하여 온열 자극장치로 사용하고, 온열 자극에 의한 치료가 금기시 되는 환부에는 선택적으로 탈착식 한랭 자극부를 부착하여 한랭 자극장치로 사용하게 되므로, 밴드에 의한 압박 자극 및 진동 모터에 의한 진동 자극과 함께 온열 자극 또는 한랭 자극을 팔이나 다리 또는 관절 부위의 실시하는 것을 특징으로 한다.

[0041] 밴드 본체(10)는 도 1에 도시된 바와 같이 팔이나 다리 등의 관절 부위 또는 허리를 둘러 감쌀 수 있는 길이로 형성되며, 압박에 의한 자극을 팔이나 다리 또는 관절 부위에 인가할 수 있도록 탄성을 갖는 밴드(11)로 이루어지며, 밴드(11)의 몸체 내부에는 진동 자극을 위한 진동 자극부(20)와 한랭/온열 자극을 위한 온도변화 자극부(30)가 내장되어 구성된다. 이러한 밴드(11)는 그 몸체의 내부에 길이방향으로 다수 개의 수납공간(12)이 형성되며, 이러한 수납공간(12)을 형성하는 각 몸체의 일측면이 길이방향을 따라 개방되고 그 개방 단부에는 지퍼(12a)가 각각 부착되어 지퍼(12a)의 개폐를 통해 수납공간(12)이 필요에 따라 개폐 가능하도록 구성된다. 이로써 각각의 수납공간(12)에는 한랭/온열 자극을 위한 온도변화 자극부(30)가 그 내부에 수납되어 장착될 수 있게 될 것이다.

[0042] 이러한 밴드 본체(10)는 링 형상, 또는 일자 형상 중의 어느 하나로 형성될 수 있으며 도 1 및 도 2에서는 일자 형상으로 형성된 경우를 예시하고 있다. 여기서 밴드 본체(10)가 일자 형상으로 형성되는 경우에 밴드(11)의 일측 단부에는 탈부착을 위한 결합부(13)가 구비되며, 이 결합부(13)의 내측에 제1벨크로테이프(13a)가 부착되고 다른측 단부에 제1 벨크로테이프(13a)에 대응하는 제2벨트로테이프(13b)가 부착되어 제1 및 제2 벨크로테이프(13a,13b)의 결합을 통해 팔이나 다리 또는 관절 부위에 필요에 따라 탈부착 가능하도록 구성된다.

[0043] 진동 자극부(20)는 환부(접촉면)에 있는 모든 통증 조절 수용기를 자극할 수 있도록 하기 위하여, 상기 밴드(11)의 길이방향으로 다수 개소에 각각 진동자가 내장되어 구비되되, 한 쌍 또는 그 이상의 개수의 진동자가 내장될 수 있다. 특히 이러한 진동자는 바람직하게는 도 1 및 도 2에 도시된 바와 같이 밴드(11)를 팔이나 다리 또는 관절 부위에 둘러 감싸는 경우 전후 또는 좌우 방향으로 진동 자극이 대향하여 인가되도록 밴드 본체(10)에 길이방향을 따라 일정 간격만큼 이격되게 내장되어 구성되는 것이다.

[0044] 온도변화 자극부(30)는 도 2 내지 도 4에 도시된 바와 같이 다수 개(바람직하게는 두 개 또는 그 이상의 개수)의 영역으로 구분된 압박 패드(11) 몸체 내부의 수납 공간(12)에 설치될 수 있으며, 바람직하게는 진동 자극부(20) 사이에 위치되게 설치된다. 이러한 온도변화 자극부(30)는 팔이나 다리 등의 관절 부위 또는 허리를 둘러 감쌀 수 있도록 밴드(11)의 몸체의 길이방향으로 배치되고, 온열 자극부(31)와 한랭 자극부(32)로 분리되어 각각 별개로 구성될 수도 있으며, 또는 펠티에 소자 등에 의해 온열 자극부(31)와 한랭 자극부(32)가 하나의 몸체로 구성될 수도 있다.

[0045] 온도변화 자극부(30)가 온열 자극부(31)와 한랭 자극부(32)로 각각 분리되어 별개로 구성되는 경우, 온열 자극부(31)는 제어장치부(40)에서 전원이 공급되면 주변으로 온찜질을 위해 일정 범위 내의 온도(예를 들면 50~80℃)에서 열을 방출하여 피부 접촉 부위에 온열 자극을 인가하는 하이 카본을 이용한 면상 발열체 등으로 구성될 수 있다. 한랭 자극부(32)는 냉동고 등에서 주변의 냉기를 흡수하여 자체적으로 냉기를 함유할 수 있으면서도 낮은 온도에서도 젤 형태를 유지하는 냉매를 팩의 내부에 수납 및 밀봉시켜 이루어지는 젤 팩으로 구성되며, 이러한 젤 팩은 탈부착 가능하게 구성하여 필요에 따라 수납공간에 수납될 수 있다. 이러한 젤 팩은 환자의 피부에 접촉되는 경우 접촉면 주변의 피부로부터 열을 흡수하여 피부 접촉부위에 한랭 자극을 인가할 수 있게 되는 것이다.

[0046] 한편, 온도변화 자극부(30)가 온열 자극부(31)와 한랭 자극부(32)로 각각 분리되어 별개로 구성되는 경우, 바람직한 실시 예로서는 밴드(11)의 각 수납공간(12)에 온열 자극부(31)와 한랭 자극부(32)가 각각 설치되어 구성되는 것이며, 또는 본 발명에 의한 복합 자극패드를 쿨팩 용도로만 사용하고자 하는 경우 밴드(11)의 각 수납공간(12)에 한랭 자극부(32)가 모두 설치되어 구성될 수도 있고, 또는 본 발명에 의한 복합 자극패드를 핫팩 용도로만 사용하고자 하는 경우 밴드(11)의 각 수납공간(12)에 온열 자극부(31)가 모두 설치되는 형태로 구성될 수도 있다.

[0047] 또한 온도변화 자극부(30)가 온열 자극부(31)와 한랭 자극부(32)로 각각 분리되어 구성되는 경우는 도 3 및 도 4의 단면도에 도시된 바와 같이 수납공간(12)의 상, 하부에 두 개 또는 한 개의 온열 자극부(31)가 설치될 수 있으며, 이 온열 자극부(31)의 내부 또는 온열 자극부(31)의 일측에 한랭 자극부(32)가 탈부착 및 수납 가능하도록 함으로써, 온열 자극부(31)에 전원이 공급되는 경우 한랭 자극부(32)가 온열 자극부(31)에 의해 온도가 상

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승할 수 있도록 하여 양쪽 모두를 온열 자극을 위한 자극부로 사용하도록 구성하는 것도 가능하게 될 것이다. 그러나 이하의 본 발명의 설명에서는 한 수납 공간(12)에 하나 또는 두 개의 온열 자극부(31)가 설치되고 그 내부에 탈부착 가능하게 한랭 자극부(32)가 설치되는 경우를 예로 들어 설명하기로 한다.

[0048] 제어장치부(40)는 진동/온열 자극에 대한 동작 제어 및 자극 온도 조절을 위한 다수의 키를 갖는 키입력부(41), 기기의 동작 상태를 표시하는 표시부(42)를 구비하며, 진동 자극부(20) 및 온도변화 자극부(30)로 동작 전원을 공급하기 위한 전원부를 일체로 내장하여 밴드 본체(10)에 장착된다. 키입력부(41)는 진동 자극에 대한 동작 제어를 위한 진동 온/오프키(41a), 온열 자극에 대한 동작 제어를 위한 온열 온/오프키(41b), 및 자극 온도 조절을 위한 온도 조절키(41c)를 구비하며 사용자 인터페이스를 위해 외부로 노출되어 구비된다. 전원부는 밴드 본체(10)를 휴대할 수 있도록 보조 배터리 또는 충전지를 사용하는 것이 바람직하다. 이로써 제어장치부(40)는 외부 사용자에 의해 설정되는 키입력신호에 따라 전원부의 동작을 제어하여 밴드 본체(10)에서의 진동 자극부(20)와 온도변화 자극부(30)의 동작을 제어할 수 있게 된다.

[0049] 이러한 구성의 본 발명에 따른 탈착식 한랭 자극부를 갖는 휴대용 열/진동 복합 자극밴드의 전체적인 동작을 설명한다.

[0050] 먼저, 본 발명에 의한 복합 자극패드를 압박에 의한 진동 자극과 함께 온열 자극 기기로 사용하고자 하는 경우, 밴드(11)의 각 수납 공간(12)에는 하이 카본을 이용한 면상 발열체 등으로 구성되는 온열 자극부(31)가 한 개 또는 두 개 각각 내장되고 젤 팩으로 구성되는 한랭 자극부(32)는 수납되지 않은 상태에서 사용될 수 있다. 반면에 본 발명에 의한 복합 자극패드를 압박에 의한 진동 자극과 함께 한랭 자극 기기로 사용하고자 하는 경우, 지퍼(12a)를 개방하여 밴드(11)의 각 수납 공간(12)에 젤 팩으로 구성되는 한랭 자극부(32)를 각각 수납한 상태에서 사용될 수 있다.

[0051] 한편, 본 발명은 온열과 한랭 자극을 복합적으로 사용할 수 있다. 즉, 한쪽에만 냉각된 젤 팩을 내장시키고, 젤 팩이 내장되지 않은 쪽의 온열 자극부(31)를 작동시켜 한쪽은 냉찜질을 하면서 다른 쪽에서는 온열찜질을 할 수 있으며, 동시에 진동 자극부(20)를 작동시켜 진동자극을 동시에 수행할 수도 있다.

[0052] 다음으로 밴드 본체(10)가 링 형상으로 형성되는 경우 밴드(11)의 탄성을 이용하여 직경을 확장시킨 상태에서 치료를 원하는 팔이나 다리 또는 관절 부위에 끼워 착용한다. 반면에 밴드 본체(10)가 일자 형상으로 형성되는 경우 결합부(13)의 제1벨크로테이프(13a)와 제2벨트로테이프(13b)를 분리시킨 상태에서 밴드(11)가 치료를 원하는 팔이나 다리 또는 관절 부위를 둘러 감싸도록 하고 제1벨크로테이프(13a)와 제2벨트로테이프(13b)를 결합하여 본 발명에 의한 복합 자극패드를 착용한다.

[0053] 이와 같이 착용한 상태에서 진동 자극과 함께 온열 자극 기기로 사용하고자 하는 경우, 제어장치부(40)의 키입력부(41)에 구비된 진동 온/오프키(41a) 및/또는 온열 온/오프키(41b)를 조작하여 원하는 자극의 종류를 선택하고, 아울러 제어장치부(40)의 표시부(42)를 주시하면서 키입력부(41)에 구비된 온도 조절키(41c)를 조작하여 원하는 자극의 세기를 선택함으로써, 밴드(11)의 탄력에 의한 압박 자극과 진동 자극부(20)에 의한 진동 자극 및 온열 자극부(31)에 의한 온열 자극이 동시에 이루어질 수 있게 된다. 반면에 진동 자극과 함께 한랭 자극 기기로 사용하고자 하는 경우, 제어장치부(40)의 키입력부(41)에 구비된 진동 온/오프키(41a)를 조작함으로써, 밴드(11)의 탄력에 의한 압박 자극과 진동 자극부(20)에 의한 진동 자극 및 한랭 자극부(32)에 의한 한랭 자극이 동시에 이루어질 수 있게 된다.

[0054] 이러한 본 발명에 따른 복합 자극패드에서 탄성을 가진 길이 조정 가능한 밴드(11)를 이용하여 압박에 의한 자극을 실시하게 되면 부종 감소효과를 얻을 수 있게 된다. 특히 압박 자극과 함께 진동 자극부(20)를 구동시키게 되면 접촉면(통증부위)에 있는 모든 통증조절 수용기를 자극할 수 있게 되어 압박 및 진동자극에 의한 마사지효과를 얻을 수 있게 되며, 이러한 마사지 자극은 피부 표층면에 있는 통증 조절 수용기들을 자극하여 통증 신호를 억제하여 통증을 감소, 및 유착 조직의 유착을 깨는데 효과적이다. 또한 본 발명에 따른 복합 자극패드에서 특히 압박 및 진동 자극과 함께 한랭 자극부(32)의 젤 팩을 이용하여 한랭 자극을 인가하게 되면 급성 통증 조절이 가능하게 된다. 즉 혈관운동신경의 반응을 통해서 국소 피부의 혈류증가뿐만 아니라 환부 근처 근육의 혈류증가, 냉각에 의해 신경의 역치상승, 전달속도 저하가 생겨 통증을 조절할 수 있게 된다.

[0055] 따라서 본 발명에 의한 휴대용 복합 자극패드를 이용하게 되면 시간 및 장소에 관계없이 한랭 자극과 압박 및 진동자극, 온열 자극과 압박 및 진동 자극 또는 한랭 및 온열 자극과 압박 및 진동자극에 의해 효율적인 자극을 선택적으로 인가할 수 있게 되어 사용자의 기호에 따라 다양하게 사용할 수 있는 이점이 있다.

[0056] 이상과 같이 본 발명은 비록 한정된 실시예와 도면에 의해 설명되었으나, 본 발명은 상기의 실시예에 한정되는

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것은 아니며, 이는 본 발명이 속하는 분야에서 통상의 지식을 가진 자라면 이러한 기재로부터 다양한 수정 및 변형이 가능하다. 따라서, 본 발명의 사상은 아래에 기재된 특허청구범위에 의해서만 파악되어야 하고, 이의 균등 또는 등가적 변형 모두는 본 발명 사상의 범주에 속한다고 할 것이다.

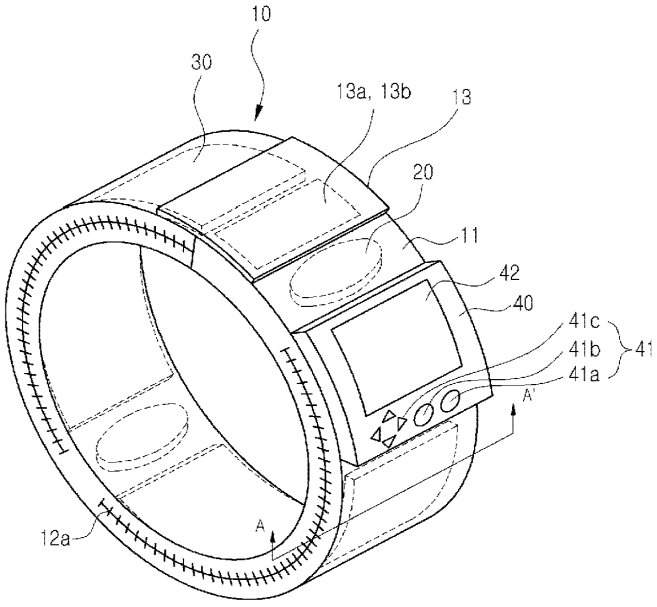
부호의 설명

[0057]

10: 밴드 본체	11 : 밴드
12 : 수납 공간	12a : 지퍼
13 : 결합부	13a,13b : 벨크로테이프
20 : 진동 자극부	30 : 온도변화 자극부
31 : 온열 자극부	32 : 한랭 자극부
40 : 제어장치부	41 : 키입력부
41a : 진동 온/오프키	41b : 온열 온/오프키
41c : 온도 조절키	42 : 표시부

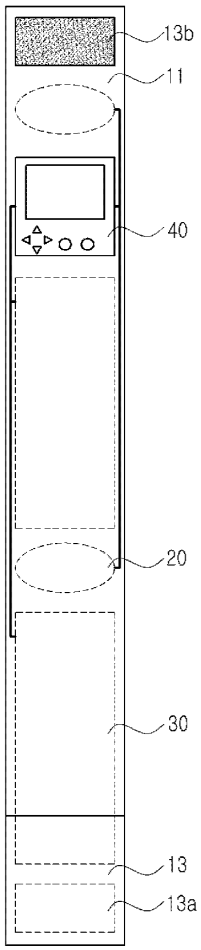
도면

도면1

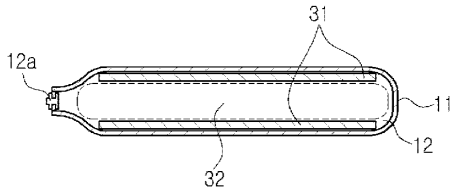


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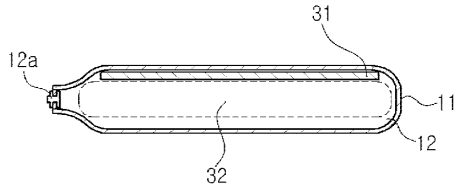
도면2



도면3



도면4



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ABSTRACT

Exemplary aspects of a treatment device are described, such as a body and a plurality of energy generator elements. The body may be provided with a processing unit and a power source. The plurality of energy generator elements may be independently operable to convert electricity from the power source into a plurality of different energy types transmittable towards an area of skin of a user. The plurality of energy generator elements may be arranged coaxially about an axis. The body may include a grip arranged to be grasped by a hand of the user applying a gripping force to maintain the plurality of energy generator elements on or adjacent the area of skin. Related apparatus, methods, and systems are described.

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(54) **APPARATUS FOR PERSONAL SKIN TREATMENT**

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Description

TECHNOLOGY FIELD

[0001] The method and apparatus disclosed herein are related to the field of personal cosmetic procedures and in particular to hair removal, wrinkle removal, acne removal, skin tightening, and other cosmetic procedures.

BACKGROUND

[0002] External appearance is important to practically every person. In recent years, methods and apparatuses have been developed for different cosmetic and dermatological treatments. Among these are hair removal, treatment of vascular lesions, wrinkle removal, skin rejuvenation and others. In some of these treatments, the skin and tissue are treated by one or more types of electromagnetic radiation such as radio frequency (RF) and optical radiation or illumination. When applied to the skin RF typically heats the skin. The illumination may be monochromatic (laser) or polychromatic including a narrow or broad spectrum of different wavelengths. The optical radiation depending on the wavelength may heat the skin, coagulate wounds, and produce photo-chemical effects. The time and intensity of the electromagnetic radiation are selected to achieve a desired effect, which is typically achieved by heating the treated skin segment to a temperature of 38-60 degrees Celsius.

[0003] The optical radiation is applied to the skin with the help of an applicator having an aperture of a given dimension. In order to "cover" the entire skin surface, the aperture has to be moved from place to place, in a relatively accurate fashion on a step equal to at least one aperture dimension, so that no areas of the skin will be missed or treated twice. In order to avoid this, the individual visually tracks applicator location. The optical radiation is frequently applied in a pulse mode. The light pulses inevitably reach his/her eyes, disturb the individual, and affect the applicator location tracking and skin treatment process. Applying optical radiation devices achieve the desired effect only if a certain energy density is applied to the skin and/or tissue. If the device is moved too quickly or too slowly across the skin, the device may be less efficacious or cause burns, respectively.

[0004] Optical radiation treats the upper skin layer and penetrates to a relatively shallow depth of no more than few millimeters. Radio Frequency (RF) is applied to the skin with the help of a pair or more electrodes that have to be in contact with the skin. RF voltage is applied across the electrodes in pulse or continuous waveform (CW). The properties of the RF voltage are selected to generate RF induced current in a volume or layer of tissue to be treated. This current heats the tissue to the required temperature, which is typically in the range of 38-60 degrees Celsius. For example, the temperature may destroy or injure the hair follicle or root and delay further hair growth, destroy or cause regeneration of the collagen tightening the skin over the treated skin segment. The effect may also be weakening of the hair shaft or even hair follicle or root destruction, collagen structure changes or destruction, and other.

[0005] Frequently the skin treatment by electromagnetic radiation is combined with mechanical procedures such as skin massages, mechanical hair removal, skin abrasion, ultrasound adipose tissue treatment, and other. For example, such desired effect as hair re-growth retardation, is typically achieved by illumination of an earlier mechanically depilated skin surface by laser, LED, Xenon lamp, Intense Pulsed Light (IPL), or incandescent lamp radiation, generally termed illumination or optical radiation. Circumference reduction is typically obtained by application of ultrasound or RF energy. Massage is known to stimulate blood flow and is frequently used for cosmetic procedures in combination with RF or illumination energy

[0006] Professional equipment that combines light and RF treatment, massage and RF treatment also exists. Usually this equipment is configured to illuminate a defined segment of a subject skin generally similar or equal to the surface of the aperture through which optical radiation is directed to the skin segment. The electrodes are typically located proximal to the periphery of the aperture and the RF typically may heat deeper tissue layers than those heated by light thus destroying/injuring hair bulbs and/or hair follicles. There is a delicate relation between the amount of RF energy and optical radiation applied to the same skin segment. Exceeding the optimal proportion between them leads to skin burns, whereas application of lower than optimal proportion RF energy and optical radiation does not bring the desired treatment results.

[0007] The above-described equipment enabling mechanical hair removal, RF energy application, optical radiation treatment, ultrasound treatment, and other cosmetic treatments is both costly and bulky. Further, such equipment is typically operated in an ambulatory set-up by a qualified operator and frequently requires the presence of medical personnel specialized in such treatments. Certain skin treatment procedures may be performed by a user himself using the available on the market equipment enabling him/her to conduct typically one type of skin treatment only. WO 2009/090632 discloses a hair removal apparatus for personal use.

[0008] The user of known personal use devices, however, does not get results similar or identical to those provided by professional equipment used for skin treatments, has no ability to perform all of the desired procedures, is not experienced in selecting proper treatment parameters and other equipment operational issues.

GLOSSARY

[0009] Several terms are utilized throughout this disclosure. The definition for these terms is provided here for convenience.

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[0010] The term "illumination sources," "optical radiation sources," and "light sources" as used in the present disclosure has the same meaning and includes sources of visible and invisible infrared radiation.

[0011] As used herein, the term "skin treatment" may include such cosmetic procedures like complete or partial hair removal, hair growth retardation, skin rejuvenation, wrinkle reduction, waist tightening, vascular lesion removal, texture improvement, cellulite reduction, skin abrasion, acne effects reduction, etc.

[0012] The term "skin surface" relates to the most external skin layer, which may be stratum corneum.

[0013] The term "tissue" relates to skin layers located below the stratum corneum. The layers may be located immediately below the stratum corneum and as deep as 6 or even 7 mm below the stratum corneum.

[0014] As used herein, the term "hair removal" may include mechanical hair removal and hair growth retardation.

[0015] Titanium Dioxide (TiO_2) is a widely used white pigment in the plastic and coatings industry. TiO_2 efficiently scatters light.

[0016] Dermabrasion is a cosmetic procedure in which the surface of the skin and in particular the stratum corneum is removed by abrasion. The instrument used to perform the procedure is called a dermabrader.

[0017] The term "keyed connector" used throughout the document means a connector operative to provide power or receive signals from the powered device or module as well as optional module orientation and identification means.

BRIEF SUMMARY

[0018] The present invention relates to an apparatus for personal cosmetic skin treatment as defined in appended claims. The apparatus enables a user of providing different cosmetic procedures such as complete or partial hair removal and hair growth deterrent, wrinkle removal or skin smoothing, skin rejuvenation, skin massaging, and other procedures. The embodiments include combinations of various interchangeable modules, with each module in the combination operative to conduct a different cosmetic skin treatment. Some of the modules enable application to the skin of (a) mechanical energy and processes for cutting, plucking or shaving hair follicles; massaging the skin for cellulite reduction and circumference changes; and skin abrasion or micro-abrasion for skin rejuvenation and acne removal; (b) modules enabling high frequency ultrasound to skin applications (c) modules and/or cartridges to provide the application of electromagnetic energy in form of skin illumination by different wavelengths or RF energy heating the skin; (d) further skin treatment techniques including the application of solutions before, after and/or during the mechanical process and/or the application of heat and/or energy. Each of the listed above processes may be applied alone or in combination with other processes or in different application sequences.

[0019] In order to conduct the desired cosmetic skin treatment the user applies applicator to the skin and couples to it one or more types of energy. The user displaces the applicator along the skin treating different skin segments. An optional displacement speed monitoring arrangement monitors the displacement speed and establishes the optical power as a function of the device displacement speed. Other sensors such as movement direction sensors, accelerometers, impedance sensors, as well as module identification tags may affect treatment parameters. Overall, the various embodiments operate to treat an area of skin, to facilitate the removal of all or a portion of hair, retard further growth, wrinkle removal or skin smoothing, acne reduction, adipose tissue distraction, and rejuvenation or health maintenance of the skin surface.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0020] The disclosure is provided by way of non-limiting examples only, with reference to the accompanying drawings, in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the method.

FIG. 1 is a schematic illustration of an exemplary embodiment of the apparatus for personal use for skin treatment.

FIG. 2 is a schematic illustration of an exemplary embodiment of the docking unit of the apparatus for personal use for skin treatment.

FIG. 3 is a schematic illustration of an exploded assembly of the docking unit of the apparatus for personal use for skin treatment.

FIG. 4 is a schematic illustration of a frontal view of an exemplary embodiment of the applicator of the apparatus for personal use for skin treatment.

FIG. 5 is a schematic illustration of a side view of an exemplary embodiment of the applicator of the apparatus for personal use for skin treatment.

FIG. 6 is a schematic illustration of a bottom view of an exemplary embodiment of the applicator of the apparatus for personal use for skin treatment.

FIG. 7 is a schematic illustration of an exploded assembly of the applicator of the apparatus for personal use for skin treatment.

FIG. 8 is a schematic illustration of a perspective view of an exemplary embodiment of a hair shaving module of the apparatus for personal skin treatment.

FIGS. 9 through 12 are schematic illustrations of the hair removal or shaving mechanism of the present apparatus for skin treatment and different states explaining the mechanism operation.

FIG. 13 is a magnified schematic illustration of a cut and retracted back hair follicle (shaft).

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FIG. 14 is a schematic illustration of another exemplary embodiment of the hair removal mechanism of the applicator.
FIG. 15 is a schematic illustration of a three-dimensional view of an exemplary embodiment of a skin illumination module of the apparatus for personal skin treatment.
FIG. 16 is a schematic illustration of a rear view of the skin illumination module of FIG. 15.
FIG. 17 is a schematic illustration of a side view of the illumination module of FIG. 15 of the apparatus for personal skin treatment.
FIG. 18 is a schematic illustration of a cross section of the illumination module of FIG. 15 illustrating details of an exemplary embodiment of an illumination cartridge of the apparatus for personal skin treatment.
FIG. 19 is a schematic illustration of a cross section of an exemplary embodiment of the applicator with illumination module of the apparatus for personal skin treatment.
FIG. 20 is a schematic perspective illustration of an exemplary embodiment of the epilator module of the apparatus for personal skin treatment.
FIG. 21 is a schematic illustration of a frontal view of an exemplary embodiment of a skin rejuvenation module of the apparatus for personal skin treatment.
FIG. 22 is a schematic illustration of an exemplary embodiment of the skin rejuvenation electrodes of the skin rejuvenation module of the apparatus for personal skin treatment.
FIG. 23 is a schematic illustration of a frontal view of an exemplary embodiment of a skin abrading module of the apparatus for personal skin treatment.
FIG. 24 is a schematic illustration of a frontal view of an exemplary embodiment of a skin massaging module of the apparatus for personal skin treatment.
FIG. 25 is a schematic illustration of another exemplary embodiment of the skin massaging roll of the skin massaging module of the apparatus for personal skin treatment.
FIG. 26 is a schematic illustration of an additional exemplary embodiment of the skin massaging roll of the skin massaging module of the apparatus for personal skin treatment.
FIG. 27 is a schematic perspective illustration (of a frontal view) of an exemplary embodiment of a vacuum module of the apparatus for personal skin treatment.
FIG. 28 is a schematic perspective illustration of another exemplary embodiment of a vacuum module of the apparatus for personal skin treatment.
FIG. 29 is a schematic perspective illustration of an exemplary embodiment of a combined RF and vacuum module of the apparatus for personal skin treatment.
FIG. 30 is a schematic illustration of an exemplary embodiment of a combined illumination, RF, and vacuum module of the apparatus for personal skin treatment.
FIG. 31 is a schematic illustration of an exemplary embodiment of the applicator with an illumination module and an epilator module of the apparatus for personal skin treatment.
FIG. 32 is a schematic illustration of an exemplary method of skin treatment using the present applicator/device and apparatus.
FIG. 33 is a schematic illustration of another exemplary method of skin treatment using the present applicator/device and apparatus.
FIG. 34 is a schematic illustration of an additional exemplary method of skin treatment using the present applicator/device and apparatus.
FIG. 35 is a schematic illustration of a further exemplary method of skin treatment using the present applicator/device and apparatus.
FIG. 36 is a schematic illustration of still another exemplary method of skin treatment using the present applicator/device and apparatus.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0021] The principles and execution of the apparatus and the method described thereby may be understood with reference to the drawings and the accompanying description of non-limiting, exemplary embodiments.

[0022] Reference is made to FIG 1, which is a schematic illustration of an exemplary embodiment of the apparatus for personal use for skin treatment. Apparatus 100 comprises an applicator or device 104 adapted for sliding movement on a subject skin, a docking unit 108, and a cord 112 (shown partially) connecting between applicator 104 and docking unit 108. Cord 112 enables electric and fluid communication between applicator 104 and docking unit 108. Apparatus 100 may receive power supply from a regular electric supply network receptacle. Applicator 104 may receive power supply from a rechargeable or regular battery. Docking unit 108 would typically charge the rechargeable batteries of applicator 104.

[0023] FIG. 2 is a schematic illustration of an exemplary embodiment of the docking unit of the apparatus for personal use for skin treatment. Docking unit 108 includes a number of push buttons 200 located on panel 204 and enabling the user to operate apparatus 100 (FIG. 1), a number of operational status indicators 208 informing the operator on the status of different procedures performed with the help of the apparatus 100, and a docking bay 212 receiving applicator 104. A receptacle (not shown) facilitates connection of the docking unit to a regular electric supply network. Push buttons 200 may have built-in LEDs or other light sources and serve as additional process status indicators.

[0024] FIG. 3 is a schematic illustration of an exploded assembly of the docking unit of the apparatus for personal use for skin treatment. Docking unit 108 houses a control

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board 300, a power supply 304, where the power supply may include a transformer with or without current rectifier, a cooling fan 308, vacuum pump 312, and other auxiliary units that may provide additional functionality beneficial to the selected skin treatment. Control board 300 controls almost all functions of the apparatus 100 (FIG. 1) and communicates with a control board 708 (FIG. 7) of applicator 104. Power supply 304 provides the necessary for operation of different skin treatment modules electric power.

[0025] FIG. 4 is a schematic illustration of a frontal view of an exemplary embodiment of the applicator of the apparatus for personal use for skin treatment. Applicator 104 is shown to include an ergonomically designed casing 404 which fits the hand palm, having a first or distal end at which infrastructure frame 408 is located and a second end 412. The second end 412 includes a receptacle 416 enabling connection of applicator 104 with help of cord 112 (FIG. 1) to docking unit 108. Also shown in the Figure are a grip sensor 420 located on both sides (FIGS. 4 and 5) of applicator 104, an ON/OFF indicator 424 informing the user of the operational status of the illumination module 1500 (FIG. 15) of the applicator and indicator 428 informing the user on type of the skin (fair or dark) treatment module inserted in the applicator 104 and their operational status. It may also inform him of the type of treatment for which the cartridge is indicated (For example hair removal, skin rejuvenation, acne treatment, and etc.). It should be emphasized that the concept can also work with no indication at all from the module as to the type of treatment. The module will operate according to the type of treatment of for which the cartridge was dedicated and the settings made on the base (high, medium, or low power) will change automatically according to the cartridge inserted in a way completely transparent to the user. (The apparatus will detect automatically the type of the cartridge.).The indicators depending on their state may light with the same or different color and a combination of indicators and their colors may indicate presence and operation of a particular skin treatment module. Grip sensor 420 serves as a safety feature. When a user holds applicator 104 he or she naturally presses grip sensor 420 and enables different voltage supplies to different functional modules inserted into infrastructure frame 408. The first end of applicator 104 features two receiving bays shown in FIGS. 5 and 6 accepting different cosmetic skin treatment modules.

[0026] FIG. 5 is a schematic illustration of a side view in the direction of arrow E of an exemplary embodiment of the applicator of the apparatus for personal use for skin treatment. The distal or first end 408 of applicator 104 includes two receiving bays 504 and 508 operative to receive at least one of a group of modules for performing cosmetic skin treatment. As it will be explained in detail below, these may be a module for hair shaving, a module for hair depilation or epilator module, a module for skin illumination, a skin abrading module, a skin massaging module, and other modules. For safety reasons electric contacts of each of the modules may be configured to activate electricity supply to the module only when the module is inserted into the appropriate location. Push button 512 is an ON/OFF switch that activates or switches off one of the modules for skin illumination 1500 (FIG. 15) when such is inserted in the appropriate receiving bay. Push button 516 activates other modules. In addition to this a number of pushes on the button 516 may enable setting different operating parameters for each of the modules. A decorative cover 520 covers an air intake opening of the applicator 104.

[0027] FIG. 6 is a schematic illustration of a bottom view in the direction of arrow G of the exemplary embodiment of the applicator of the apparatus for personal use for skin treatment. Receiving bay 508 is operative to receive and provide a mechanical and electrical interface to any one of the skin treatment modules having an identical interface. Such modules may be a module for hair shaving, a module for hair depilation, acne RF and vacuum treatment module, a module for skin rejuvenation, a skin massage module, and other. Connector 604 has a type of key mechanism preventing insertion of a non-matching type of module and opening 606 serves for connection to vacuum pump 312 (FIG. 3). Receiving bay 504 is operative to receive and provide a mechanical and electrical interface to any one of the illumination modules. Such modules may be a module that includes an incandescent lamp, a module with xenon lamp or Xenon IPL lamp, a module with laser diode, LED, or a combination of two or more of illumination sources or other modules with matching interface. Connector 608 also has a type of key mechanism preventing insertion of a non-matching type of module. In addition each of the skin treatment modules includes a tag identifying the module and setting the module operational parameters. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others. Opening 612 provides an input channel to a flow of cooling fluid, which may be a gas or simply air.

[0028] FIG. 7 is a schematic illustration of an exploded assembly of the applicator of the apparatus for personal use for skin treatment. Applicator 104 includes a two part case 704 incorporating a control printed circuit board 708 which for packaging purposes is divided into a number of electrically communicating segments, a blower or a fan 712 providing a stream of cooling fluid to the illumination module (not shown), and grip sensors 420. According to some embodiments of the disclosure, the blower 712 is rotary blower that blows air shown by arrows 1828 (FIG. 18) into one side of the illumination or optical radiation providing module, cools the disposable cartridge 1800, the source of optical radiation 1808 and the reflector 1812 and emerges from the opposite side as shown by arrows 1828 of the optical radiation providing module. Control circuit board 708 may include different sensors such as movement direction sensors, accelerometers, impedance sensors, and others as well as control circuitry of micro switches operated by insertion

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of different module, temperature sensors processing circuits, module tag identification and treatment parameters setting circuit, and others. Alternatively, some of the sensors may be located in appropriate skin treatment modules and their processing circuits may be located on control board 308 (FIG. 3) At least one optional audio status indicator such as a buzzer signaling to the user the status of skin treatment process parameters may be attached to applicator I04. Alternatively, a buzzer may be located in base unit I08.

[0029] FIG. 8 is a schematic illustration of a perspective view of an exemplary embodiment of a shaver module of the apparatus for personal skin treatment. Shaver module 800 includes a case 804 incorporating a hair shaving or hair removal mechanism 808 to be disclosed in detail below, a pair of release buttons 812 enabling easy shaver module release from the applicator, a keyed connector 816, and a tag identifying the module and setting the module operational parameters. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others.

[0030] FIGS. 9 through 12 are schematic illustrations of the hair removal or shaving mechanism of the present apparatus for skin treatment and different states explaining the mechanism operation. FIG. 9 illustrates a first state of the operation of an exemplary hair removal mechanism in operation. FIG. 10 illustrates a second state of operation of the exemplary hair removal mechanism in operation. In the exemplary embodiment illustrated in FIG. 9, hair removal mechanism 900 may include at least one, and in some embodiments more than one, set of tweezers 908 attached to a holder 316 rotating around axis 912. Adjacent to tweezers 908 attached to the same axes is an optional lever 920 terminated by a blade 924. Alternatively, lever 920 may be rigidly coupled to tweezers 908 to ensure a constant follow-up after tweezers 908. There is a preset difference or offset between the location of tweezers 908 and the location of blades 924 of lever 920 with respect to skin 930. Typically, blade 924 would be located closer to skin 930 than tweezers 908. The difference in the location of blade 924 and tweezers 908 may be regulated according to the type of skin, hair, and particular treated segment of the subject casing.

[0031] For hair 904 removal, tweezers 908 are applied to skin 930. Holder 916 rotates in the direction indicated by arrow 928 and concurrently with rotation may move linearly on the surface of skin 930 in the direction indicated by arrow 932. As tweezers 908 continue to rotate to the second state, they pick-up at least one hair shaft or follicle 904 (FIG. 10) and begin pulling it out of skin 930. A pulling force generated by the rotation of tweezers 908 and assisted by linear movement of holder 916 applied to hair shaft 904 pulls together with hair shaft 904, skin 930 surrounding the hair shaft and follicle. This force deforms skin 930 and forms a type of goose bump or goose pimple 1040 protruding over the rest of the skin surface surrounding the follicle. Blade 924 cuts hair 904 (FIG. 11) substantially close to the peak of goose bump 1040. The pulling force is set to a particular tension with respect to the hair that is sufficient to tension the hair shaft but not to pull it out of the skin.

[0032] FIG. 13 is a magnified schematic illustration of a cut and retracted back hair shaft or follicle. Following the cut of hair shaft 904, skin 930 that formed goose bump 1040, retracts or returns to its normal at rest state. The residuals 906 of hair shaft 904 retract to the original position. The residual 906 of hair shaft 904 retracts deeper than skin surface or stratum corneum 930, such depth being indicated by numeral 1304, which marks the difference in the locations of the cut end of the residual 306 of the hair shaft 904 and skin surface 930. As can be seen in the figure, the end of the residual 906 resides substantially below skin surface 930. Numeral 1308 indicates the underlying tissue.

[0033] FIG. 11 illustrates a third state of the operation of the exemplary hair removal mechanism in operation. FIG. 12 illustrates a fourth state of operation of the exemplary hair removal mechanism. Holder 916 (FIGS. 11 and 12) continues to rotate in the direction indicated by arrow 928 and move linearly or in any other type of motion on the surface of skin 930 in the direction indicated by arrow 932. In the third state, tweezers 908 catch another hair shaft 904 and form bump 1040 in the fourth operational state in a way similar to the one explained above. Next, hair 904 is cut in a way similar to the way that the previous hair shaft was cut. The tweezers 908 and blades 924 may be orientated in the same direction or staggered and oriented in different directions. When some of the tweezers 908 and blades 924 are oriented in different directions, the user may move back along the earlier treated skin segment and still be efficacious. When tweezers 908 and blades 924 are orientated in the same direction the user at the end of treatment stroke may rotate applicator 104 (FIGs. 1 and 4) and move it in the opposite direction or simply reposition it to treat the next skin segment.

[0034] Alternatively, the hair removal mechanism 808 (FIG.8) may be any one of the well-known mechanical hair removal mechanisms such as a razor, shaving, or an electric shaver such as for example, feminine electric shaver commercially available from Braun GmbH, Germany - model 3470 Softperfect. This model also includes other detachable heads of plucking and tweezing mechanisms. Similar or even the same mechanisms are also, of course, applicable to male hair removal/shavers. The illumination head/s may be attached and operate with a conventional shaver or epilator with only one head of either a shaver or epilator, or even a razor. The hair removal mechanism may be an interchangeable mechanism, where the mechanism most appropriate for the task is assembled on the applicator.

[0035] FIG 14 is a schematic illustration of another exemplary embodiment of the hair removal mechanism. A comb type protective plate 1400 protects skin 930 and especially bumps 1040 from occasional damage by ro-

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tating blades 924 (FIG 3). The comb type protecting plate 1400 may be attached to the applicator 104 or held independently by a user. Blades 924 may be replaced by a fixed blade, which would cut hair 904 pulled by tweezers 908. In such embodiments, holder 916 in addition to rotation may have a linear motion. Alternatively, two comb-like blades linearly sliding with respect to each other may be implemented to cut the hair.

[0036] FIG. 15 is a schematic illustration of a three-dimensional view of an exemplary embodiment of a skin illumination module of the apparatus for personal skin treatment. Module 1500 includes a case 1504 incorporating one or more illumination sources, a pair of release buttons 1512 enabling easy illumination module release from the applicator, and a keyed connector 1516. A transparent protective window 1520 protects the illumination source. A pair of RF electrodes 1524 located along the protective window are operative to provide RF energy or radiation to the treated skin segment (not shown). In course of their operation the illumination sources emit large amount of heat. The heat as it will be explained in detail below is evacuated from the module by a cooling fluid flow or air generated by blower 712 (FIG. 7) through exhaust opening 1528. As explained above insertion of skin illumination or optical radiation providing module 1500 (FIG. 15), into its location in applicator 104 activates a module type detection mechanism. This prevents idle or erroneous operation of module 1500 and other skin treatment modules that the user may use. For example no high voltages will be present and "alive" in the RF electrodes 1524 of the module 1500 so that no one is subject to high voltage danger if the disposable cartridge is removed. As an additional safety measure, supply of RF energy to electrodes 1524 may be enabled only when both electrodes are applied to skin and the impedance between the electrodes is above certain threshold value. Module 1500 may be configured to operate as an illumination module only, as an RF energy applying module or both of them. In some embodiments a temperature sensor such as for example, a thermocouple may be mounted into one or both electrodes.

[0037] FIG. 16 is a schematic illustration of a rear view of the skin illumination module of FIG. 15. In addition to the described earlier elements the FIG. shows cooling fluid intake opening 1604 through which the stream of cooling fluid, which may be air, enters module 1500 and is exhausted through exhaust opening 1528 (FIG. 15) and a rear side1608 of a disposable cartridge containing one or more illumination or light sources.

[0038] Illumination module 1500 (FIG. 15) may include a variety of sources, a few non-limiting examples include an incandescent lamp, xenon lamp, laser diodes, LED, laser diodes or even a combination of two or more of these sources as well as other sources. The illumination sources may operate in a pulsed, continuous, graduated, modulated, oscillating or other operation mode as well as a combination of two or more of these modes. The power and operational times of the sources are selected to avoid potential damage to the treated segment of skin. In some embodiments each of the illumination sources may be packed in a cartridge-like packaging detachable from the illumination module 1500. The cartridge like packaging of the illumination source advantageously allows different illumination sources to be used with the same illumination module and applicator. The cartridge further includes a tag identifying the module and setting the module operational parameters. The tag may include a permanent data record which stores the type of the module, type of recommended treatment and recommended treatment parameters and a variable data record. The operational parameters may include optical and or RF power setting for fair or dark skin and for the various treatments which are each uniquely associated with the cartridge (e.g. cartridge type #1 for hair from fair skin removal, cartridge type #2 for hair from dark skin removal, cartridge type #3 for skin rejuvenation, cartridge type #4 for acne treatment, as well as other types of cartridges.) pulse duration and others. The variable data record enables recording the amount of events in course of which the module was operative. The data recorded into the tag enables upon the tag insertion into the applicator operation of the module. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others.

[0039] In some embodiments where it is desired or there exists a difference between the treatment parameters applicable to different skin types, the modules may be color coded facilitating easy distinction between them and avoiding erroneous use of the module.

[0040] FIG. 17 is a schematic illustration of a side planner view in the direction of arrow *L* of the illumination module of FIG. 15 and FIG. 18 is a cross section along plane D-D of the illumination module of FIG. 17 illustrating details of an exemplary embodiment of an illumination cartridge of the apparatus for personal skin treatment.

[0041] Disposable cartridge 1800 includes a source of optical radiation 1808, a reflector 1812 configured to reflect the emitted optical radiation to the segment of the skin (not shown) to be treated, and a dielectric coated protective window 1816. Window 1816 defines the aperture through which the optical radiation is emitted to the skin. The source of optical radiation 1812 may be an incandescent lamp such as AGAC 4627 high power density Xenon flash lamp commercially available from Perkin Elmer Optoelectronics Wenzel-Jaksch Str. 31 65199 Wiesbaden, Germany or any one of a group of LED, laser diode, solid state laser, a gas laser, or a Xenon IPL (Intense Pulsed Light) lamp.

[0042] Reflector 1812 is a prismatic case or a rectangular body with flat facets and polygonal cross section or a tubular cross section with an optional curvature of second or higher power. It may be a simple round cylinder cross section, a parabolic cross section or any other cross section allowing the optical radiation to be emitted across the aperture of window 1816 through which the optical radiation is emitted to the skin. The dielectric coating of

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window 1816 is selected such as to transmit the relevant sections of optical radiation spectrum to the treated segment of the skin and reflect the other. Reflector 1812 has butt end openings 1820 allowing air passage inside the reflector. The dielectric coated protective window 1816 located adjacent or attached to the open longitudinal section of reflector 1812 forms with the reflector 1812 an air-conducting channel 1824 bound on one side by reflector 1812 and on the other side by window 1816. A part of the stream of cooling air shown by arrow 1828 generated by a cooling fan 712 (FIG. 7) enters channel 1824 through butt end opening 1820 of reflector 1812. It is directed into the air-conducting channel 1824 along the source of optical radiation 1812 and cools it. Butt end openings 1820 of reflector 1812 terminate air-conducting channel on both of it ends and serve as cooling air exhaust openings. The area of reflector 1812 air exhaust openings 1528 is at least equal or larger to the area of openings 1820 allowing air passage into inner part of reflector 1812 and air conducting channel 1824. Optionally, a part of cooling air stream 1828 may be directed to flow around the external section of reflector 1812 and cools the outer section of reflector 1812.

[0043] According to some embodiments of the disclosure rotary blower 712 (FIG. 7) blows cooling air shown by arrows 1828 into one side of the disposable cartridge 1800 where the air flows in parallel (along) to the source of optical radiation 1808 and the reflector 1812 and emerges from the opposite side as shown by arrows 1828 of the optical radiation providing module 1800.

[0044] According to some embodiments of the disclosure, as also depicted schematically in FIG. 18, a second glass window 1520 is installed in parallel to window 1816 and part of the cooling air blown by the blower 712 and marked by arrow 1828 flows between the two windows 1520 and 1816. A slanted lamp electrode 1844, as shown in FIG. 18, may be installed on the air intake side of the optical radiation source 400, to enhance air flow in the direction of the windows. Arrows 1828 schematically illustrate the cooling air flow inside and outside reflector 1812 and between the windows 1520 and 1812. A bended support 1852 of reflector 1812 prevents return flow of hot air. Windows 1520 and 1838 may be made of Pyrex®, sapphire, quartz, or specially treated borosilicate glass. Window 1030 or both windows may be coated with a dielectric coating serving as a filter for reflecting back undesired wave lengths, such as UV and certain IR wavelengths, emitted from the optical radiation source 1808.

[0045] According to some embodiments of the disclosure, a thermal sensor, such as a thermistor or any other type of temperature measuring sensor may be installed on either inflow or the outflow end of the cooling air, as a safeguard against overheating in case of malfunction of the cooling means. Alternatively, temperature sensors may be installed in any other designated point in the cartridge and be operatively configured to sense the temperature in such designated point in the cartridge and communicate the temperature to the controller board 708 (FIG. 7). According to some embodiments of the disclosure, as also shown in FIG. 18, two reflectors may be mounted between the two windows (1520 and 1816), on both sides thereof, to prevent light scattering outside the treatment area. Alternatively, the disposable cartridge 1800 of applicator 104 may be made of a plastic material containing an amount of titanium dioxide (TiO_2) sufficient to disperse the reflected illumination.

[0046] The architecture of illumination or optical radiation providing module 1500 and method of cooling it allows a compact and effective optical radiation source to be produced and provide sufficient power for skin treatment. Module 1500 may operate in pulsed or continuous operation mode. It is known that low repetition rate optical radiation or light pulses are annoying the user who may be constantly visually tracking the applicator location. In order to ease the user's sensation, the optical radiation source may emit a number of low power light pulses interleaved between high power treatment pulses, increasing the repetition rate of the light pulses to a frequency of 16 Hz or more and alleviating the annoying and eye disturbing effects of low repetition rate light pulses.

[0047] According to some embodiments of the disclosure, an RFID device is connected to cartridge 1800 communicating with control circuit 708 (FIG. 7). The RFID device is preloaded with a maximal number of pulses to be emitted before the cartridge 1700 of illumination providing module 1500 has to be replaced and decreases the count with every emitted pulse. Alternatively, the RFID device is preloaded with a total energy that may be applied to the skin in a single treatment before the cartridge 1800 of the illumination providing module 1500 (FIG. 15) has to be replaced. The RFID device may also serve as an additional safety measure, where the control circuit 708 prevents the radiation providing module 1500 from emitting pulses if the RFID is not identified, namely the optical radiation or illumination providing module 1500 has not been installed correctly.

[0048] In an additional embodiment, a 1024 Bit 1-Wire EEPROM such as DS2431 commercially available from Maxim/Dallas Semiconductors, Inc., Sunnyvale, CA 94086 U.S.A. 1-Wire EEPROM operating as a counter can be assembled on the control printed circuit 708 that among others controls the radiation providing module 1500. Similar to the RFID the counter may be pre-loaded with the desired information. The same 1-Wire EEPROM may function for radiation providing module 1500 authenticity identification.

[0049] FIG. 19 is a schematic illustration of a cross section of an exemplary embodiment of the applicator with illumination module of the apparatus for personal skin treatment. In use illumination module 1500 containing one or more illumination sources is inserted into a receiving bay 504 of the applicator 104. Keyed connector 1516 ensures that only compatible modules could be inserted into receiving bay 504 of applicator 104.

[0050] FIG. 20 is a schematic perspective illustration of an exemplary embodiment of the epilator module of

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the apparatus for personal skin treatment. Epilator module 2000 includes a case 2004 incorporating a hair epilating or hair removal mechanism 2008 to be disclosed in detail below, a pair of release buttons 2012 enabling easy epilator module release from the applicator, a keyed connector 2016, and a tag identifying the module and setting the module operational parameters. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others. The epilator mechanism may be such as Silkepil, commercially available from Braun GmbH, Germany.

[0051] FIG. 21 is a schematic illustration of a frontal view of an exemplary embodiment of a skin rejuvenation module of the apparatus for personal skin treatment. Skin rejuvenation module 2100 includes a case 2104 incorporating a matrix of skin rejuvenating electrodes 2108, a pair of release buttons 2112 enabling easy epilator module release from the applicator, a keyed connector 2116, and a tag identifying the module and setting the module operational parameters. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others.. As it will be explained below skin abrasion module 2300 (FIG. 23) may also be used for skin rejuvenation.

[0052] FIG. 22 is a schematic illustration of an exemplary embodiment of the skin rejuvenation electrodes of the skin rejuvenation module of the apparatus for personal skin treatment. The skin rejuvenation electrode 2108 disclosed in detail in US Patent Application Serial Number 12/505,576 to the same assignee filed on July 20 , 2009, is a segmented electrode and it includes a central segment 2204 being in size of about 15 to 20mm wide and two peripheral segments 2208 arranged along the circumference/perimeter of segment 2204. Central segment 2204 is populated by a plurality of small terminated by a spherical shape or flat RF providing electrodes 2212. Thermal and electrical insulation 2216 between central segment 2204 and peripheral segments 2208 is also illustrated. Typically, the thermal and electrical insulation is about 0.5-1.0mm wide. In the current embodiment of the segmented RF electrode, the peripheral segments 2208 about 2 to 4mm wide and are made of a thermally conductive material. Electrodes 2212 are made of electrically conductive material and electrodes 2208 are made of electrically conducting or ceramic material. In particular, the tested segments 2208 of the electrodes were made of materials selected from a group consisting of metal oxides or Ceramics. Aluminum nitride, Boron nitride, and similar are examples of such materials. Electrode 2108 may be of rectangular, elliptical or other suitable shape or even a flat surface. Electrodes 2208 may have uniform width or sections of different width. In some embodiments the electrodes may be coated by a dielectric coating. RF source may provide RF energy to the electrodes and a thermal sensor may be incorporated in each of the electrodes.

[0053] FIG. 23 is a schematic illustration of a frontal view of an exemplary embodiment of a skin abrading module of the apparatus for personal skin treatment. Skin abrading module 2300 includes a case 2304 incorporating a skin abrading roll 2308, a pair of release buttons 2312 enabling easy abrading module release from the applicator, a keyed connector 2316, and a tag identifying the module and setting the module operational parameters. Skin abrading roll 2308 may be a metal or plastic roll coated with fine diamond powder or by fine ScotchBrightTM type material. Alternatively, abrading roll 2308 may be a soft material roll coated by fine ScotchBrightTM type material or completely made of a ScotchBrightTM type material.

[0054] A DC motor and a gear mounted in the inner compartment of case 2304 provide rotation to skin abrading roll 2308. As the user moves the skin abrading module 2300 along the treated skin segment, skin abrading roll 2308 may rotate such that linear speed of surface 2320 of skin abrading roll 2308 would be greater or smaller than the speed with which user displaces the skin abrading module 2300. In one embodiment, skin abrading roll 2308 may rotate in a direction where the linear speed of surface 2320 matches the skin abrading module 2300 displacement direction. In another embodiment, skin abrading roll 2308 may rotate in a direction where the linear speed of surface 2320 is oriented in a direction opposite to the skin abrading module 2300 displacement direction.

[0055] In an additional embodiment, skin abrading roll 2308 may be replaced by two or more diamond coated or ScotchBrightTM coated rolls rotating with different speed and pulling in between then different segments of treated skin. Abraded, dead, or flat stratum corneum skin cells may be removed later by a soft pad and a skin cooling lotion or cream. Alternatively, skin abrading module 2300 may have a vacuum slit or vacuum openings implemented in the skin abrading roll that would remove by suction abraded stratum corneum particles.

[0056] The friction between the skin abrading roll 2308 and the skin is high and it develops forces that in addition to removal of the stratum corneum may cause displacement of the abrading module over the treated skin segment. Displacement speed monitoring arrangement mounted on controller board 708 (FIG. 7) could be in communication with the controller controlling module 2300 movement and set a proper displacement speed, leaving to the user discretion application of proper for particular treatment pressure.

[0057] FIG. 24 is a schematic illustration of a frontal view of an exemplary embodiment of a skin massaging module of the apparatus for personal skin treatment. Skin massaging module 2400 includes a case 2404 incorporating a skin massaging roll 2408, a pair of release buttons 2412 enabling easy massaging module release from the applicator, a keyed connector 2416, and a tag identifying the module and setting the module operational parameters. Skin massaging roll 2408 may be a metal or plastic roll in which a series of grooves 2420 and protru-

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sions or ribs 2424 is made. In one embodiment, roll 2408 may have a type of braking mechanism resisting displacement of skin massaging module 2400 across the treated skin segment. In course of module 2400 displacement, skin enters grooves 2420 and is massaged by protrusions 2424.

[0058] Alternatively, a DC motor and a gear mounted in the inner compartment of case 2404 may provide rotation to skin massaging roll 2408. The rotation speed of roll 2408 may be selected such as to enable pull of the skin into grooves 2420.

[0059] FIG. 25 is a schematic illustration of another exemplary embodiment of the skin massaging roll of the skin massaging module of the apparatus for personal skin treatment. Skin massaging roll 2408 may be a single roll or an assembly of two or more rolls 2504 and 2408. Rolls 2504 and 2508 may have identical protrusions 2420 and grooves 2424. Alternatively, as shown in FIG 25b) rolls 2504 and 2512 may have protrusions directed in opposite direction. Each of the rolls may rotate at a different speed enhancing the skin massaging action.

[0060] FIG. 26 is a schematic illustration of an additional exemplary embodiment of the skin massaging roll of the skin massaging module of the apparatus for personal skin treatment. Roll 2108 includes a plurality of vacuum openings 2616 operative to suck the skin into grooves 2624 between protrusions 2420 further enhancing the massaging action of the skin massaging module 2400. As explained above the massaging module may be implemented to support a difference in the linear speed of the massaging roll 2408 and the speed applicator 104 displacement over the skin. This may further enhance the massaging action.

One of the interchangeable modules may be an ultrasound providing module. Provisional Patent application serial number 61/248,997 filed on October 6, 2009 to the same assignee discloses such a module and a method of ultrasound to skin application, where the transducers are positioned at a predetermined distance from each other on opposing borders of an area of skin being treated and at a predetermined angle relative to the surface of the skin. The angle between the transducers is maintained by a wedge made of a sound index - matching material as known in the art. The distance between the transmitter and receiver is dependent on the thickness of the tissue at the area to be treated. The transducers are operative to emit ultrasound beams, commonly in pulse form, at an angle relative to the surface of skin to be treated so that a portion of the emitted beams impinge upon skin tissue at a Brewster's angle of incidence, and follow propagation path, which is generally parallel to the surface of the skin through treated area producing a desired skin treatment effect.

[0061] FIG. 27 is a schematic perspective illustration (of a frontal view) of an exemplary embodiment of a vacuum module of the apparatus for personal skin treatment. Module 2700 includes a case 2704 incorporating a miniature vacuum pump 2708, a pair of release buttons 2712 enabling easy vacuum module release from the applicator, a keyed connector 2716 through which power is supplied to the miniature vacuum pump and identifying and proper locating the module, and a tag 2720 identifying the module and setting the module operational parameters. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others. Suction opening 2724 is surrounded by a suction cup 2728 attaching the module to the skin surface. Cup 2724 may be made of a soft antiallergenic material such as polyurethane, silicone, or similar. Vacuum suction removes from the skin for example, abraded epidermis particles, acne, black and white heads, and other debris. The exhausted air is evacuated from the module through an exhaust tube 2732 communicating with vacuum pump 312 (FIG. 30) through opening 606 (FIG. 6). The sucked in debris is retained inside module 2700 and disposed upon completion of the treatment. In an additional embodiment, the debris may be collected in the docking unit 108 (FIG. 1 and 3) and disposed periodically. In an additional embodiment the debris may be evacuated through exhaust tube 2732 with the rest of the air, in the simplest form. The level of vacuum is selected to cause the desired effect and still enable continuous displacement of the applicator over the skin surface. Module 2700 across the skin displacement allows gentle massaging of the treated skin area and thus loosens/softens the acne blackheads or the whiteheads from the root The module 2700 can be a disposable module

[0062] FIG. 28 is a schematic perspective illustration of another exemplary embodiment of a vacuum module of the apparatus for personal skin treatment. Module 2800 includes a case 2804, a pair of release buttons 2812 enabling easy module release from the applicator, and a keyed connector 2816. In some embodiments connector 2816 is a dummy connector. It does not convey electric signals and serves mainly as means to stabilize the module in place. In another embodiment where a tag identifying the module and setting the module operational parameters is included in the module, connector 2816 may carry electrical signals from the tag. A connecting tube 2820 enables vacuum module 2800 through opening 606 (FIG. 6) connection to vacuum pump 312 (FIG. 3). Suction opening 2824 is surrounded by a suction cup 2828 attaching the module to the skin surface. Cup 2824 may be made of a soft antiallergenic material such as polyurethane, silicone, or similar. Vacuum suction removes from the skin for example, abraded epidermis particles, acne, black pimples and others. Collected debris may be retained inside module 2800 and the sucked-in air may be evacuated from the module through a regular exhaust opening in docking station 108 (FIG. 1 and 3). Alternatively, the debris may also be evacuated through a regular exhaust opening in the docking station. Module 2800 may be implemented as a disposable module.

[0063] FIG. 29 is a schematic perspective illustration of an exemplary embodiment of a combined RF and vac-

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uum module of the apparatus for personal skin treatment. Module 2900 includes a case 2904 incorporating a pair of RF electrodes 2908 operative to couple RF energy to the treated segment of skin, a pair of release buttons 2912 enabling easy module 2900 release from the applicator, a keyed connector 2916, and a tag 2920 identifying the module and setting the module operational parameters. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others. Suction opening 2932 is surrounded by a suction cup 2928 attaching the module to the skin surface. Cup 2928 may be made of a soft antiallergenic material such as polyurethane, silicone, or similar. A connecting pipe or tube 2924 enables vacuum module through opening 606 (FIG. 6) to vacuum pump 312 (FIG. 3) connection. Vacuum suction may remove from the skin abraded epidermis particles, acne, black and white heads, and others. The level of vacuum is selected to cause the desired effect and still enable continuous displacement of the applicator over the skin surface. This module displacement allows gentle massaging of the treated skin area assisting in acne removal and other procedures.

[0064] FIG. 30 is a schematic illustration of an exemplary embodiment of a combined illumination, RF, and vacuum providing module of the apparatus for personal skin treatment. Module 3000 may be implemented as a combination of the illumination cartridge 1500 and vacuum module 2700 or 2800. Module 3000 includes a case 3004 incorporating an illumination module 3008 with the illumination cartridge operative to couple illumination to the treated segment of the skin and vacuum module 3010. Cartridge 3008 is generally similar to cartridge 1500, although the dimensions and configuration may be different. Cartridge 3008 includes a pair of RF electrodes 3024 similar to electrodes 1524 (FIG. 15) of cartridge 1500 operative to couple RF energy to the treated skin segment, a pair of release buttons 3012 enabling easy module 3000 release from the applicator, and a keyed connector 3016. Cartridge 3008 may be surrounded by a suction cup 3028 with vacuum openings 3032 communicating through module 3010 and vacuum connecting tube or pipe 3020 through opening 606 (FIG. 6) to vacuum pump 312 (FIG. 3). When vacuum is supplied to suction cup 3028 it operates to attach module 3000, or more specifically, attach module 3008 to the skin surface. Cup 3028 may be made of a soft antiallergenic material such as polyurethane, silicone, or similar. Vacuum suction removes for example, abraded epidermis particles, acne, black and white heads, and others. The vacuum is beneficial not only in removing the debris. It's also beneficial in the coupling of optical and RF energy to the tissue. The level of vacuum is selected to cause the desired effect and still enable continuous or step like displacement of the applicator over the skin surface. Module 3000 displacement allows gentle massaging of the treated skin area assisting in acne removal. Vacuum also stretches the skin being in contact with the protective glass of illumination module 3008. This increases the efficiency of the illumination by reducing illumination scattering present when a gap between the protective glass and the skin exists as well as scattering by the dermal structure of the skin. Module 3000 is a combination of a disposable illumination cartridge and a disposable vacuum cartridge and as such may be implemented as a disposable module. Additionally, cup 3028 may be implemented as a disposable cup. Module 3000 may include a tag 3040 identifying the module and setting the module operational parameters. The tag may be an RFID, EEPROM, or a simple electronic circuit with unique characteristics such as resistance, capacitance, and others.

[0065] FIG. 31 is a schematic illustration of an exemplary configuration of the applicator with an illumination module and an epilator module of the apparatus 100 (FIG 1) for personal cosmetic skin treatment. For coupling to the applicator 104 modules 1500 and 2000 are slid as shown by arrow 3100 into their respective receiving bays 504 and 508 and positively fixed in their locations. Electronics located on printed circuit board 708 (FIG. 7) recognizes the identification tag of the module and sets its operating parameters. Applicator 104 is now ready for use and set to perform at least two procedures, as will be explained below, enabled by the inserted modules. In order to exchange a module the user presses release buttons 1512 or 2012 extracts the earlier inserted module and inserts a different desired module.

[0066] In a similar way the user may assemble any other combination of different modules and perform different cosmetic skin treatment.

[0067] FIG. 32 is a schematic illustration of an exemplary method of cosmetic skin treatment using the present applicator/ device and apparatus. For skin treatment, applicator 104 is applied to a segment of skin 3200 to be treated, enabling firm or at least mostly firm contact between the RF electrodes 1524 (FIG. 15) and the skin. Optical radiation providing module 1500 is activated and it illuminates the skin section to be treated and the RF energy supplied to the electrodes 1524 weakens hair roots and hair follicle or even destroys them. The user or a built-in mechanism for continuously displacing the device across the skin displaces device 104 in a desired direction indicated by arrow 2404, for example, along the segment of the skin to be treated. In one embodiment, optical radiation is directed through aperture of illumination cartridge 1500 to irradiate a segment of skin 3200 to be treated by a constant optical radiation power and RF energy, both set by the appropriate module identification tag and supplied in continuous or pulsed mode, and the applicator 104 is displaced along the skin segment to be treated in the direction of arrow 3204.

[0068] Displacement speed monitoring arrangement mounted on controller board 708 (FIG. 7) may set a proper displacement speed. The displacement speed - optical radiation power or RF energy dependence may be prepared and loaded as a look-up-table (LUT) into control

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circuit 708 or 300. As the treatment progresses and device 104 advances across the skin, it reaches the border of the skin segment to be treated. As device 104 reaches the end of the treated or shaved skin segment, the user manually repositions device 104 on the next segment of skin to be treated or on another non-treated segment of the skin and sets it for displacement into the same or opposite direction. The danger of causing skin burns by treating the same segment of skin twice is reduced, since there is some time for the skin to cool down between successive skin treatments by device 104. Optical radiation coupled with the RF energy retards future hair growth on the treated segment of the skin by heating hair follicle. RF energy applied to the same skin segment also heats deeper skin layers where hair bulbs and follicles are located, enhancing the hair removal process performed by the optical radiation. Weakened hair may be easier removed by an epilator module 2000 that follows the illumination module.

[0069] Some skin pretreatment operations such as skin cleaning performed by water and soap or other cleaning means, may be introduced. The frequency of the RF energy applied for the skin treatment is typically in the range of 6.0 MHz to 7.0 MHz and generally does not require application of gel improving electric contact between electrodes 1524 and skin 3200.

[0070] In an additional exemplary method of skin treatment using the present device and apparatus, the user applies the applicator or skin treatment device 104 to a skin segment from which hair has to be removed. The epilator is moved in the direction indicated by arrow 3232 and the hair is removed from the skin segment by mechanical means, for example by epilator module 2100. Following mechanical hair removal, optical radiation of proper power and wavelength is applied to the same segment of skin that was treated. Optionally, RF energy may be applied to the same segment of skin. Application of optical radiation and RF energy retards further hair growth. Similar to the earlier disclosed method the user displaces the applicator 104 or the applicator displacement mechanism displaces itself automatically from a treated skin segment to another untreated skin segment.

[0071] FIG. 33 is a schematic illustration of another exemplary method of skin treatment using the present applicator and apparatus. For skin rejuvenation treatment, applicator or device 104 is applied to a segment of skin 3300 to be treated, enabling firm or at least mostly firm contact between the RF electrodes 1524 and the skin 3300. The user, or a built-in mechanism for continuously displacing the device across the skin, displaces device 104 in a desired direction indicated by arrow 3304, for example, along the segment of the skin to be treated. RF energy is applied to electrodes 2208 and 2212 (FIG. 22) of the skin rejuvenation module 2100. It is well known that stratum corneum, the upper skin layer, is a dielectric and until certain voltage stressing it beyond its dielectric strength is applied to it, the stratum corneum resists electrical breakdown. As the RF voltage supplied by source of RF voltage exceeds the electrical breakdown threshold, an electrical discharge takes place. The absence of a conductive fluid between the skin 2504 and the electrodes 2208 and 2212 of the applicator 104 allows the device to achieve a higher skin break-down potential and prevents the occurrence of a short circuit between the individual voltage supplying elements 2212.

[0072] The absence of a conductive fluid also facilitates limiting fractal skin damage caused by the RF voltage or energy radiating from the dome type contacts 2212 to the skin contact points only. The discharge ablates the stratum corneum and since the coupling between voltage supplying elements terminated by domes 2212 and the skin 2500 is a conductive coupling, it enables electric current flow from the apex of dome 2212 to highly conductive epidermis and dermis and deeper located skin layers. Enabled by skin breakdown, electric current heats and coagulates some of the target section of skin 2800 volume initially in contact with the domes 2212 and in immediate vicinity of domes 2212 generating an array or matrix of microscopic skin wounds. The dome shaped form of the voltage applying elements 2212 facilitates electric discharge that takes place between the apex of the dome shaped elements 2212 and contact spot on the skin 3200. The domes 120 however, do not penetrate the skin. Healing of these wounds rejuvenates (tightens) the damaged skin segment and reduces or removes wrinkles existing at this skin segment. The illumination module 1500 may be equipped by a source of illumination with a wavelength stimulating faster wound healing, such as for example, 450nm or 550nm.

[0073] As it was noted above a plurality of cartridges may be used with illumination module 1500 (FIG 15). The optical radiation sources can be selected to provide visible, infrared (IR), blue, or even ultraviolet optical radiation at different intensity levels. For example, for acne treatment the user may test and select appropriate illumination cartridge matching the best for him or her acne treatment mode. The optical radiation sources may be operated in a continuous or pulse operation mode and according to fair or dark skin settings. Operation mode setting may be performed automatically by detecting the skin type by a skintype sensor, or set manually set, or preset according to the type of the cartridge.

[0074] The treatment may be enhanced by application to the same skin segment of radio frequency energy. The RF energy may be selected to heat the skin and tissue to an effective treatment temperature without ablating the skin. The combined energies of optical radiation in the appropriate spectrum range with radio frequency (RF) enable highly selective targeting of the sebaceous glands and acne bacteria. Infrared and RF energies reduce sebaceous gland activity while blue light simultaneously destroys active acne.

[0075] FIG 34 is a schematic illustration of an additional exemplary method of skin treatment using the present applicator and apparatus. Applicator 104 includes skin abrasion module 2300 (FIG 23) and illumination module

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1500 (FIG 15). In this configuration applicator 104 may be used for such cosmetic skin treatment procedures as skin rejuvenation, wrinkle removal, acne treatment, skin pigmentation treatment, and other skin treatments. For skin treatment, applicator or device 104 is applied to a segment of skin 3400 to be treated and displaced by the user or as disclosed above by activating skin abrasion module 2300 and displaces applicator 104 in a desired direction indicated by arrow 3404, for example, along the segment of the skin to be treated. Operation of skin abrasion module 2300 removes the electrically isolating stratum corneum layer enabling easy access to bare epidermis layer. The particles of the exfoliated stratum corneum layer may be removed by vacuum. The skin exfoliation process increases blood and interstitial fluid flow to the treated skin segment and significantly reduces electrical resistance of the skin. Skin illumination module 1500 immediately follows abrasion module 2300. Low bare epidermis resistance enables firm firm or at least mostly firm contact between the RF electrodes 1524 and the skin 3400. Low electrical resistance of the treated skin enables application of relatively low frequency 300 kHz to 700 kHz deep into skin penetrating RF energy. The depth of RF energy penetration allows treating of collagen and adipose tissue containing layers. These frequencies are also effective in cellulite treatment and destruction. The treatment may be highly localized (corresponding to the distance between electrodes 1524 of illumination module 1500) and targeted for example, to double chin removal, small skin pigmentation spots removal, acne smoothing, and other treatments.

[0076] The process of skin exfoliation increases blood and interstitial fluid flow to the treated skin segment (stimulating circulation) further increasing heat absorption and accelerating appearance of the desired skin effect.

[0077] The skin abrasion treatment followed by RF and luminous energy application to bare epidermis layer removes dead cells, stimulates blood circulation enhancing heat in tissue conduction and dissipation, and rejuvenates the skin structure by replacing the old dull skin with fresh, younger cells and encouraging the regeneration of collagen and elastin for firmer, healthier looking skin.

[0078] Acne may be treated by a combination of abrasion module 2300 and illumination module 1500. Abrasion module removes a thin superficial skin layer and proper illumination wavelength of 500 - 550 nm may be used to speed-up the skin healing process.

[0079] In addition it is possible to supplement the treatment by applying topical agents such as a polyphenolic based antioxidant serum containing polyphenolic flavonoids and polyphenolic diterpenes (e.g.,epigallocatechin, ursolic acid). This of course will improve even further the treatment results. See for example, Bruce M Freedman, "Topical antioxidant application augments the effects of intense pulsed light therapy" Journal of Cosmetic Dermatology, 8, 254-259, 2009.

[0080] FIG. 35 is a schematic illustration of a further exemplary method of skin treatment using the present applicator/device and apparatus. Applicator 104 includes vacuum module 2700 (FIG 27) or 2800 (FIG. 28) and illumination module 1500 (FIG 15). In this configuration applicator 104 may be used for such cosmetic skin treatment procedures as acne treatment, waist tightening, skin pigmentation treatment, and other skin treatments. For skin treatment, the user applies applicator or device 104 to a segment of skin 3500 to be treated and activates skin illumination module 1500. The user displaces applicator 104 in a desired direction indicated by arrow 3504 or 3532, for example, along or across the segment of the skin to be treated. Operation of skin illumination module 1500 in pulse or continuous mode heats skin 3500, softens it and enables vacuum, applied by the vacuum module 2700 or 2800 following the illumination module 1500 to effectively pull out of the skin acne, whiteheads, blackheads, and other impurities. In addition to acne, the same process may be targeted for example, to small skin pigmentation spots removal, and other treatments. As noted above the suction enables better skin to illumination window and electrodes coupling and accordingly better treatment results.

[0081] FIG. 36 is a schematic illustration of still another exemplary method of skin treatment using the present applicator/device and apparatus. Applicator 104 includes a combined illumination and RF module 1500 (FIG 15) and a vacuum module 3000. In this configuration applicator 104 may be used for such cosmetic skin treatment procedures as acne treatment, skin pigmentation treatment, hair growth reduction, skin rejuvenation, skin tightening, and other skin treatments. For skin treatment, applicator or device 3600 is applied to a segment of skin to be treated and displaced by the user across the skin segment. RF energy is supplied to electrodes and it induces current in the skin. The current heats the skin and softens it. RF energy may be supplied in a continuous or pulse mode. Softened and heated skin enables vacuum, applied by the same module to effectively pull out of the skin acne, whiteheads, blackheads, and other impurities. Illumination module may include one or more light sources, for example LEDs, of different wavelength. Certain wavelengths may be applied to accelerate skin surface heating other wavelengths, for example blue or ultraviolet may be applied to disinfect the treated skin segment accelerate skin healing and smoothing or skin rejuvenation.

[0082] The disclosed apparatus enables a casual user in a residential set-up to perform himself or herself almost every skin treatment procedure by using a variety of modules that may be inserted into the infrastructure frame. Although the applicator simultaneously receives only two types of skin treatment modules, these may be replaced after use for modules providing a different type of skin treatment. Such skin treatment modules like epilator, shaver, exfoliation or abrasive module and massage head apply a mechanical action to the skin. Ultrasound module applies ultrasound waves to the skin. Intense pulsed light and RF apply electromagnetic radiation to the skin. A combination of these modules may be used

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to provide a variety of skin treatments such as hair removal, skin rejuvenation, skin exfoliation, acne treatment,
circumference reduction, and other skin treatments.

[0083] The effect of some of the treatments may be further enhanced by applying the treatment after a bath or shower when the skin is clean and soft. A combination of different modules providing different treatments to the same skin segment for example heat and vacuum, mechanical hair removal and illumination and others help to combat almost all types of skin deficiencies regardless treated skin type.

[0084] Several embodiments have been described using detailed descriptions thereof that are provided by way of example and are not intended to be limiting. The described embodiments comprise different features, not all of which are required in all embodiments. Some embodiments utilize only some of the features or possible combinations of the features. Variations of embodiments that are described and embodiments comprising different combinations of features noted in the described embodiments will occur to persons of the art.

Claims

1. Apparatus for personal cosmetic skin treatment comprising an applicator (104), the applicator (104) comprising
an infrastructure frame (408) including two receiving bays (504, 508) operatively configured to receive combinations of different interchangeable modules, with each module in the combination operative to conduct a different cosmetic skin treatment and operative to apply at least one of the cosmetic skin treatments alone or in combination with another module, with each of the modules including at least an identification tag identifying the module and containing the module operational parameters; wherein the applicator includes a grip sensor (420) located on both sides of the applicator (104), an ON/OFF indicator (424) informing the user on operational status of an illumination module (1500) and an indicator (428) informing the user on type of skin treatment module inserted in the applicator (104) and their operational status and wherein the grip sensor (420) serves as a safety feature enabling different voltage supplies to different functional modules inserted into infrastructure frame (408) when a user holds applicator (104) and presses grip sensor (420),
wherein the apparatus further comprises an applicator docking station including a control unit operative to provide power supply to the applicator, fluids required for applicator operation, and control the applicator movement; and wherein the control unit communicates with the identification tag, identifies the received module, and automatically sets the skin treatment parameters.

2. The apparatus according to claim 1, wherein the infrastructure frame (408) including two receiving bays (504, 508) receives at least one of a group of interchangeable modules operative to perform a cosmetic skin treatment, said group consisting of modules for mechanical hair removal (2008), a module for wrinkle removal, a module for skin rejuvenation, a module for acne treatment, a module for collagen shrinking, a module for skin abrasion; and
wherein each of the interchangeable modules have an identical mechanical and electrical interface and each of the modules has identification tag.

3. The apparatus according to any of claims 1-2, wherein the modules further include at least one connector including a key mechanism that prevents insertion of a non-matching type of module into said applicator.

4. The apparatus according to any of claims 1-3, wherein the tag identifying the module comprises a permanent data record which stores the type of the module, type of recommended treatment and recommended treatment parameters, and a variable data record enabling to record the amount of events in course of which the module was operative; and
wherein the data recorded into the tag enables upon the tag insertion into the applicator operation of the module.

5. The apparatus according to any of claims 2-3, wherein the applicator (104) further comprises a case (704) including at least a control printed circuit board (708) including different sensors, the board being in communication with the identification tag of each of the modules and according to skin type treated automatically seting at least one of a group of treatment parameters consisting of the RF power, IPL pulse repetition rate, and IPL power.

6. The apparatus according to any of claims 2-3, wherein the applicator (104) further comprises at least one of a group of sensors consisting of direction sensors, micro switches, temperature sensors, and impedance sensors, and
wherein the direction sensor is operative to activate at least one of the modules according to the applicator displacement direction when the applicator is applied to a subject skin and displaced over the skin and the micro switches are operative to enable activation of at least one of the modules when the applicator is gripped by a subject and wherein the temperature sensor is operative to change the operation mode of at least one of the modules according to the rate of temperature change.

7. The apparatus according to claim 3, wherein the module for skin rejuvenation (2100) further includes

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a case (2104) incorporating a matrix of skin rejuvenating electrodes (2108), and wherein the skin rejuvenation electrode (2108) is a segmented electrode including a central segment (2204) populated by a plurality of small terminated by a spherical shape or flat RF providing electrodes (2212) and two peripheral segments (2208) arranged along a perimeter of central segment (2204) and thermal and electrical insulation (2216) located between the central segment (2204) and the peripheral segments (2208).

8. The apparatus according to claim 7, wherein the RF providing electrodes are at least one of a group of uncoated or dielectric coated electrodes, and wherein at least one of impedance sensors or temperature sensors controls RF energy to the segment of skin delivery and wherein the RF energy is delivered to the skin segment in a continuous mode and a pulse mode.

9. The apparatus according to claim 3, wherein the skin massaging module (2400) further includes a case (2404) incorporating at least a skin massaging roll (2408) in which a series of grooves (2420) and protrusions (2424) is made to allow the skin in course of displacement of skin massaging module (2400) across the treated skin segment to enter grooves (2420) and be massaged by protrusions (2424).

10. The apparatus according to claim 3, wherein the skin massaging module (2400) further includes a case (2404) incorporating an assembly of two or more skin massaging rolls (2408, 2504) in which a series of identical protrusions (2420) and grooves (2424) is made and wherein each of the rolls (2408, 2504) rotate at a different speed enhancing the skin massaging action.

11. The apparatus according to claim 3, wherein the skin abrading module (2300) further includes a case (2304) incorporating at least a skin abrading metal or plastic roll (2308) coated with fine diamond powder, a DC motor and a gear mounted in the inner compartment of case (2304) to rotate the skin abrading roll (2308) such that linear speed of surface (2320) of the skin abrading roll (2308) is greater or smaller than the speed with which user displaces the skin abrading module (2300) along the treated skin segment.

12. The apparatus according to claim 1, further comprising a vacuum module (2700) including a case (2704) incorporating at least a miniature vacuum pump (2708) to provide suction and a suction opening (2724) surrounded by a suction cup (2728) attaching the module to the skin surface and wherein the suction removes from the skin abraded epidermis particles, acne, black and white heads, and other debris.

13. The apparatus according to claim 1, further comprising a combined illumination, RF, and vacuum providing module (3000) including a case (3004) incorporating an illumination module (3008) including a pair of RF electrodes (3024) with the illumination module operative to couple illumination to the treated segment of skin and the pair of electrodes operative to couple RF energy to the treated segment of skin and vacuum module (3010) operative to remove abraded epidermis particles, acne, black and white heads, and stretch the skin being in contact with protective glass of illumination module (3008) to increase efficiency of the illumination by reducing illumination scattering present when a gap between the protective glass and the skin exists as well as scattering by the dermal structure of the skin.

14. The apparatus according to claim 1, wherein the applicator (104) further comprises a combined illumination module (1500) and a skin abrading module (2300) and wherein the skin abrading module (2300) is operative to remove electrically isolating stratum corneum layer and access to low resistance bare epidermis layer to provide firm contact between RF electrodes (1524) of the illumination module (1500) and the skin (3400).

15. The apparatus according to claim 14, wherein the RF electrodes (1524) apply to the treated skin deep into the skin penetrating low frequency 300 kHz to 700 kHz RF energy.

Patentansprüche

1. Vorrichtung zur persönlichen kosmetischen Hautbehandlung umfassend einen Applikator (104), wobei der Applikator (104) folgendes umfasst
einen Unterbaurahmen (408) einschließlich zwei Empfangsöffnungen (504, 508), die betriebsfähig konfiguriert sind, um Kombinationen von verschiedenen austauschbaren Modulen zu empfangen, wobei jedes Modul der Kombination betriebsfähig ist, um eine verschiedene kosmetische Hautbehandlung durchzuführen und betriebsfähig ist, um mindestens eine der kosmetischen Hautbehandlungen allein oder in Kombination mit einem anderen Modul anzuwenden, wobei jedes Modul folgendes umfasst mindestens eine Identifizierungsmarke, welche das Modul identifiziert und die Betriebsparameter des Moduls enthält; wobei der Applikator folgendes umfasst: einen Griffsensor (420), der auf beiden Seiten des Applikators (104) angeordnet ist, einen EIN/AUS-Anzeiger (424), der dem Benutzer über den Betriebsstatus eines Beleuchtungsmoduls (1500) informiert und einen Anzeiger (428), der dem Benutzer über den Typ des in den Applikator (104) eingesetzten Hautbehandlungsmoduls und dessen

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Betriebsstatus informiert und wobei der Griffsensor (420) als eine Sicherheitseigenschaft dient, welche die Versorgung von verschiedenen Spannungen an verschiedene in den Unterbaurahmen (408) eingesetzte Funktionsmodule ermöglicht, wenn ein Benutzer den Applikator (104) hält und auf den Griffsensor (420) drückt,
wobei die Vorrichtung weiterhin eine Dockstation für den Applikator umfassend eine Steuereinheit umfasst, die betriebsfähig ist, um den Applikator mit Strom zu versorgen, Flüssigkeiten bereitzustellen, die für den Betrieb des Applikators notwendig sind, und die Bewegung des Applikators zu steuern; und
wobei die Steuereinheit verbunden mit der Identifizierungsmarke ist, das empfangene Modul identifiziert und die Hautbehandlungsparameter automatisch einstellt.

2. Die Vorrichtung nach Anspruch 1, wobei der Unterbaurahmen (408), der zwei Empfangsöffnungen (504, 508) umfasst mindestens eines von einer Gruppe von austauschbaren Modulen empfängt, die betriebsfähig sind, um eine kosmetische Hautbehandlung durchzuführen, wobei die Gruppe aus Modulen zur mechanischen Haarentfernung (2008), einem Modul zur Faltenbeseitigung, einem Modul zur Hautverjüngung, einem Modul zur Behandlung von Akne, einem Modul zur Kollagenschrumpfung, einem Modul zur Hautabschürfung besteht; und
wobei jedes austauschbare Modul eine identische mechanische und elektrische Schnittstelle hat und jedes Modul eine Identifizierungsmarke hat.

3. Die Vorrichtung nach einem der Ansprüche 1-2, wobei die Module weiterhin mindestens einen Anschluss einschließlich eines Schlüsselmechanismus umfasst, der die Einführung von einem unpassenden Modultypen in den Applikator verhindert.

4. Die Vorrichtung nach einem der Ansprüche 1-3, wobei die Marke, welche das Modul identifiziert, eine permanente Datenaufzeichnung umfasst, welche den Typ des Moduls, die Art der empfohlenen Behandlung und die empfohlenen Behandlungsparameter speichert, und eine variable Datenaufzeichnung umfasst, welche die Speicherung der Anzahl von laufenden Ereignissen ermöglicht, bei denen das Modul betriebsfähig war; und
wobei die in der Marke gespeicherten Daten den Betrieb des Moduls ermöglicht, nachdem die Marke in den Applikator eingesetzt worden ist.

5. Die Vorrichtung nach einem der Ansprüche 2-3, wobei der Applikator (104) weiterhin einen Kasten (704) umfasst, der mindestens eine Steuerleiterplatte (708) umfasst, welche verschiedene Sensoren umfasst, wobei die Platte verbunden mit der Identifizierungsmarke von jedem Modul ist und gemäß des behandelten Hauttyps mindestens einen von einer Gruppe von Behandlungsparametem bestehend aus HF-Leistung, IPL-Pulswiederholrate und IPL-Leistung automatisch einstellt.

6. Die Vorrichtung nach einem der Ansprüche 2-3, wobei der Applikator (104) weiterhin mindestens einen von einer Gruppe von Sensoren bestehend aus Richtungssensoren, Mikroschaltern, Temperatursensoren, und Impedanzsensoren umfasst, und
wobei der Richtungssensor betriebsfähig ist, um mindestens eines der Module gemäß der Verschiebungsrichtung des Applikators zu aktivieren, wenn der Applikator auf die Haut eines Menschen angewendet wird und über die Haut geschoben wird und die Mikroschalter betriebsfähig sind, um die Aktivation von mindestens einem der Module zu ermöglichen, wenn der Applikator von einem Menschen gegriffen wird und wobei der Temperatursensor betriebsfähig ist, um den Betriebsmodus von mindestens einem der Module gemäß der Geschwindigkeit der Temperaturänderung zu ändern.

7. Die Vorrichtung nach Anspruch 3, wobei das Modul zur Hautverjüngung (2100) weiterhin einen Kasten (2104) umfasst, der eine Reihe von hautverjüngenden Elektroden (2108) umfasst, und wobei die hautverjüngende Elektrode (2108) eine segmentierte Elektrode umfassend ein mittleres Segment (2204) ist, das eine Vielzahl von kleinen in einer kugeligen Form endenden oder flachen HF-bereitstellenden Elektroden (2212) und zwei periphere Anschnitte (2208) umfasst, die entlang eines Umfangs des mittleren Abschnitts (2204) angeordnet sind, und thermische und elektrische Isolierung (2216) zwischen dem mittleren Segment (2204) und den peripheren Segmenten (2208) umfasst.

8. Die Vorrichtung nach Anspruch 7, wobei die HF-bereitstellenden Elektroden mindestens eine aus einer Gruppe von unbeschichteten oder dielektrisch-beschichteten Elektroden sind, und wobei mindestens einer der Impedanzsensoren oder Temperatursensoren die an das Hautsegment gelieferte HF-Energie steuert und wobei die HF-Energie an das Hautsegment kontinuierlich und im Puls-Modus geliefert wird.

9. Die Vorrichtung nach Anspruch 3, wobei das hautmassierende Modul (2400) weiterhin einen Kasten (2404) umfasst, der mindestens eine hautmassierende Rolle (2408) enthält, in der eine Reihe von Nuten (2420) und Vorsprüngen (2424) vorhanden ist, um das Eintreten der Haut in die Nuten (2420) und deren Massage durch die Vorsprünge (2424) während der Verschiebung des hautmassierenden Moduls (2400) entlang des Segments behandelter Haut zu ermöglichen.

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10. Die Vorrichtung nach Anspruch 3, wobei das hautmassierende Modul (2400) weiterhin einen Kasten (2404) umfasst, der eine Anordnung von zwei oder mehr hautmassierenden Rollen (2408, 2504) enthält, in denen eine Reihe von identischen Vorsprüngen (2420) und Nuten (2424) vorhanden ist und wobei jede Rolle (2408, 2504) mit einer verschiedenen Geschwindigkeit dreht, was die Massagewirkung der Haut verbessert.

11. Die Vorrichtung nach Anspruch 3, wobei das hautabschürfendes Modul (2300) weiterhin einen Kasten (2304) umfasst, der mindestens eine mit feinem Diamantpulver beschichtete hautabschürfende Metall- oder Kunstoffrolle (2308), einen DC-Motor und ein Getriebe umfasst, das in der inneren Abteilung des Kastens (2304) montiert ist, um die hautabschürfende Rolle (2308) so zu drehen, dass die lineare Geschwindigkeit der Oberfläche (2320) der hautabschürfenden Rolle (2308) größer oder geringer als die Geschwindigkeit ist, mit der der Benutzer das hautabschürfendes Modul (2300) entlang des Segments behandelter Haut schiebt.

12. Die Vorrichtung nach Anspruch 1, weiterhin umfassend ein Vakuummodul (2700) umfassend einen Kasten (2704), der mindestens eine Mini-Vakuumpumpe (2708) umfasst, um Saugkraft bereitzustellen und eine Ansaugöffnung (2724) umfasst, die von einem Saugnapf (2728) umgebunden ist, der das Modul an der Hautoberfläche befestigt und wobei die Saugkraft abgeschürfte Epidermispartikel, Akne, geschlossene und offene Komedonen, und andere Verunreinigungen aus der Haut entfernt.

13. Die Vorrichtung nach Anspruch 1, weiterhin umfassend ein kombiniertes Modul (3000), das Beleuchtung, HF, und Vakuum bereitstellt umfassend einen Kasten (3004), welcher ein Beleuchtungsmodul (3008) enthält, das ein Paar von HF-Elektroden (3024) umfasst, wobei das Beleuchtungsmodul betriebsfähig ist, um Beleuchtung an das behandelte Hautsegment zu liefern und das Paar von Elektroden betriebsfähig ist, um HF-Energie an das behandelte Hautsegment zu liefern und das Vakuummodul (3010) betriebsfähig ist, um abgeschürfte Epidermispartikel, Akne, geschlossene und offene Komedonen zu entfernen und um die in Kontakt mit einem Schutzglas des Beleuchtungsmoduls (3008) stehende Haut zu strecken, um die Effizienz der Beleuchtung zu erhöhen, in dem die Lichtstreuung, die entsteht, wenn zwischen dem Schutzglas und der Haut ein Abstand gegeben ist und die durch die Dermisstruktur der Haut verursachte Streuung verringert werden.

14. Die Vorrichtung nach Anspruch 1, wobei der Applikator (104) weiterhin ein kombiniertes Beleuchtungsmodul (1500) und ein hautabschürfendes Modul (2300) umfasst und wobei das hautabschürfende Modul (2300) betriebsfähig ist, um eine elektrisch isolierende Schicht von Stratum comeum zu entfernen und auf eine widerstandsarme bloße Epidermisschicht zu zugreifen, um einen festen Kontakt zwischen RF-Elektroden (1524) des Beleuchtungsmoduls (1500) und der Haut (3400) bereitzustellen.

15. Die Vorrichtung nach Anspruch 14, wobei die HF-Elektroden (1524) tief in die Haut eindringende HF-Energie niedriger Frequenz von 300 kHz bis 700 kHz an die behandelte Haut anwenden.

Revendications

1. Appareil pour le traitement cosmétique personnel de la peau comprenant un applicateur (104), l'applicateur (104) comprenant
un châssis d'infrastructure (408) incluant deux caissons de réception (504, 508) configurés de façon opérationnelle pour recevoir des combinaisons de modules interchangeables différents, avec chaque module dans la combinaison étant opérationnel pour effectuer un traitement cosmétique de la peau différent et opérationnel pour appliquer au moins un des traitements cosmétiques de la peau seul ou en combinaison avec un autre module, avec chacun des modules incluant
au moins une étiquette d'identification identifiant le module et contenant les paramètres opérationnels du module ; dans lequel l'applicateur inclut un capteur de poignée (420) situé des deux côtés de l'applicateur (104), un indicateur ON/OFF (424) informant l'utilisateur sur l'état de fonctionnement d'un module d'illumination (1500) et un indicateur (428) informant l'utilisateur sur le type de module de traitement de la peau inséré dans l'applicateur (104) et leur état de fonctionnement et dans lequel le capteur de poignée (420) sert de caractéristique de sécurité permettant des alimentations en tension différentes à des modules fonctionnels différents insérés dans le châssis d'infrastructure (408) lorsqu'un utilisateur tient l'applicateur (104) et appuie sur le capteur de poignée (420),
dans lequel l'appareil comprend en outre une station d'accueil pour l'applicateur incluant une unité de contrôle opérationnelle pour fournir une alimentation en courant à l'applicateur, des fluides nécessaires pour le fonctionnement de l'applicateur, et contrôler le mouvement de l'applicateur ; et dans lequel l'unité de contrôle est en communication avec l'étiquette d'identification, identifie le module reçu et ajuste automatiquement les paramètres de traitement de la peau.

2. L'appareil selon la revendication 1, dans lequel le

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châssis d'infrastructure (408) incluant deux caissons de réception (504, 508) reçoit au moins un dans un groupe de modules interchangeables opérationnels pour effectuer un traitement cosmétique de la peau, ledit groupe étant constitué de modules pour l'épilation mécanique (2008), un module pour l'enlèvement des rides, un module pour le rajeunissement de la peau, un module pour le traitement de l'acné, un module pour le rétrécissement du collagène, un module d'abrasion cutanée ; et
dans lequel chacun des modules interchangeables a une interface mécanique et électrique identique et chacun des modules a une étiquette d'identification.

3. L'appareil selon l'une quelconque des revendications 1-2, dans lequel les modules incluent en outre au moins un élément de raccordement incluant un mécanisme clé qui empêche l'insertion d'un type non-correspondant de module dans ledit applicateur.

4. L'appareil selon l'une quelconque des revendications 1-3, dans lequel l'étiquette identifiant le module comprend un bloc de données permanentes qui stocke le type du module, le type de traitement recommandé et les paramètres de traitement recommandés, et un bloc de données variables permettant l'enregistrement de la quantité d'événements pendant lesquels le module était en fonctionnement ; et dans lequel les données enregistrées dans l'étiquette permettent lors de l'insertion de l'étiquette dans l'applicateur le fonctionnement du module.

5. L'appareil selon l'une quelconque des revendications 2-3, dans lequel l'applicateur (104) comprend en outre un boîtier (704) incluant au moins un circuit imprimé de contrôle (708) incluant des capteurs différents, le circuit étant communiqué avec l'étiquette d'identification de chacun des modules et ajustant automatiquement en fonction du type de peau traité au moins un parmi un groupe de paramètres de traitement constitué de la puissance RF, la cadence de répétition des impulsions IPL, et la puissance IPL.

6. L'appareil selon l'une quelconque des revendications 2-3, dans lequel l'applicateur (104) comprend en outre au moins un parmi un groupe de capteurs constitué de capteurs de direction, micro-commutateurs, capteurs de température, et capteurs d'impédance, et dans lequel le capteur de direction est opérationnel pour actionner au moins un des modules en fonction de la direction de déplacement de l'applicateur lorsque l'applicateur est appliqué à la peau d'un individu et déplacé sur la peu et les micro-commutateurs sont opérationnels pour permettre l'activation d'au moins un des modules lorsque l'applicateur est saisi par un individu et dans lequel le capteur de température est opérationnel pour changer le mode de fonctionnement d'au moins un des modules en fonction du taux de variation de température.

7. L'appareil selon la revendication 3, dans lequel le module pour le rajeunissement de la peau (2100) inclut en outre un boîtier (2104) incorporant une matrice d'électrodes de rajeunissement de la peau (2108), et dans lequel l'électrode de rajeunissement de la peau (2108) est une électrode segmentée incluant un segment central (2204) peuplé d'une pluralité d'électrodes d'alimentation en RF petites à terminaison en forme sphérique ou plates (2212) et deux segments périphériques (2208) disposés le long d'un périmètre de segment central (2204) et de l'isolation thermique et électrique (2216) située entre le segment central (2204) et les segments périphériques (2208).

8. L'appareil selon la revendication 7, dans lequel les électrodes d'alimentation en RF sont au moins un dans un groupe d'électrodes sans revêtement ou avec un revêtement diélectrique, et dans lequel au moins un des capteurs d'impédance ou capteurs de température contrôle l'alimentation en énergie RF au segment de la peau et dans lequel l'énergie RF est fournie au segment de la peau en mode continue ou d'impulsions.

9. L'appareil selon la revendication 3, dans lequel le module de massage de la peau (2400) inclut en outre un boîtier (2404) incorporant au moins un rouleau de massage de la peau (2408) dans lequel une série de rainures (2420) et saillies (2424) est réalisée pour permettre l'entrée de la peau lors du déplacement du module de massage de la peau (2400) à travers le segment de peau traité dans les rainures (2420) et son massage par les saillies (2424).

10. L'appareil selon la revendication 3, dans lequel le module de massage de la peau (2400) inclut en outre un boîtier (2404) incorporant un ensemble de deux ou plus rouleaux de massage de la peau (2408, 2504) dans lesquels une série de saillies (2420) et rainures (2424) identiques est réalisée et dans lequel chacun des rouleaux (2408, 2504) tourne à une vitesse différente améliorant l'action de massage de la peau.

11. L'appareil selon la revendication 3, dans lequel le module d'abrasion de la peau (2300) inclut en outre un boîtier (2304) incorporant au moins un rouleau d'abrasion de la peau en métal ou plastique (2308) enrobé de poudre de diamant fine, un moteur en CC et un engrenage monté dans le compartiment intérieur du boîtier (2304) pour faire tourner le rouleau d'abrasion de la peau (2308) de façon que la vitesse linéaire de la surface (2320) du rouleau d'abrasion de la peau (2308) est supérieure ou inférieure à la

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vitesse avec laquelle l'utilisateur déplace le module d'abrasion de la peau (2300) le long du segment de peau traité.

12. L'appareil selon la revendication 1, comprenant en outre un module de vide (2700) incluant un boîtier (2704) incorporant au moins une pompe à vide miniature (2708) pour fournir de l'aspiration et un orifice d'aspiration (2724) entouré d'une ventouse (2728) attachant le module à la surface de la peau et dans lequel l'aspiration enlève de la peau des particules d'épiderme abrasée, de l'acné, des points noirs et blancs, et d'autres formes de débris.

13. L'appareil selon la revendication 1, comprenant en outre un module combiné fournissant de l'illumination, de la RF, et du vide (3000) incluant un boîtier (3004) incorporant un module d'illumination (3008) incluant une paire d'électrodes RF (3024) avec le module d'illumination étant opérationnel pour coupler de l'illumination au segment traité de la peau et la paire d'électrodes opérationnelle pour coupler de l'énergie RF au segment traité de la peau et le module de vide (3010) opérationnel pour enlever des particules d'épiderme abrasée, de l'acné, des points noirs et blancs, et étirer la peau qui est en contact avec un verre de protection du module d'illumination (3008) afin d'augmenter l'efficience de l'illumination en réduisant la dispersion de l'illumination existante lorsqu'un écart est présent entre le verre de protection et la peau ainsi que la dispersion par la structure dermique de la peau.

14. L'appareil selon la revendication 1, dans lequel l'applicateur (104) comprend en outre un module d'illumination combiné (1500) et un module d'abrasion de la peau (2300) et dans lequel le module d'abrasion de la peau (2300) est opérationnel pour enlever une couche de stratum corneum électriquement isolante et accéder à une couche d'épiderme nue à basse résistance pour fournir un contact ferme entre les électrodes RF (1524) du module d'illumination (1500) et la peau (3400).

15. L'appareil selon la revendication 14, dans lequel les électrodes RF (1525) appliquent à la peau traitée de l'énergie RF basse fréquence pénétrante profondément dans la peau de 300 kHz à 700 kHz.

Petitioner Therabody Ex-1004, 0656

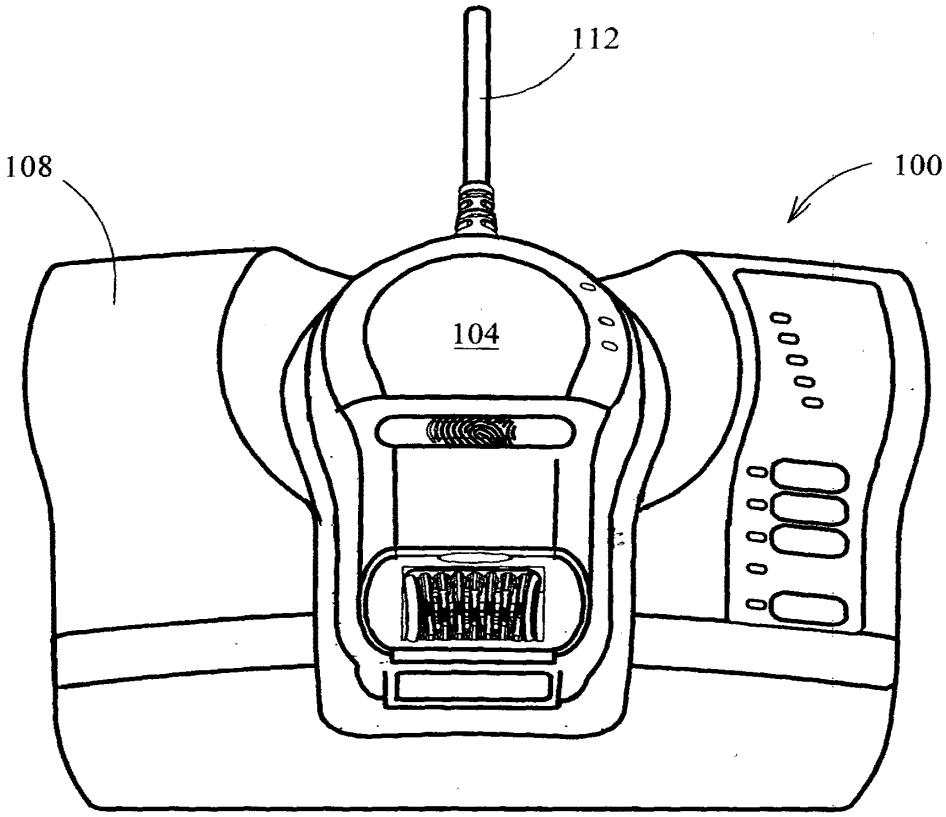


FIG.1

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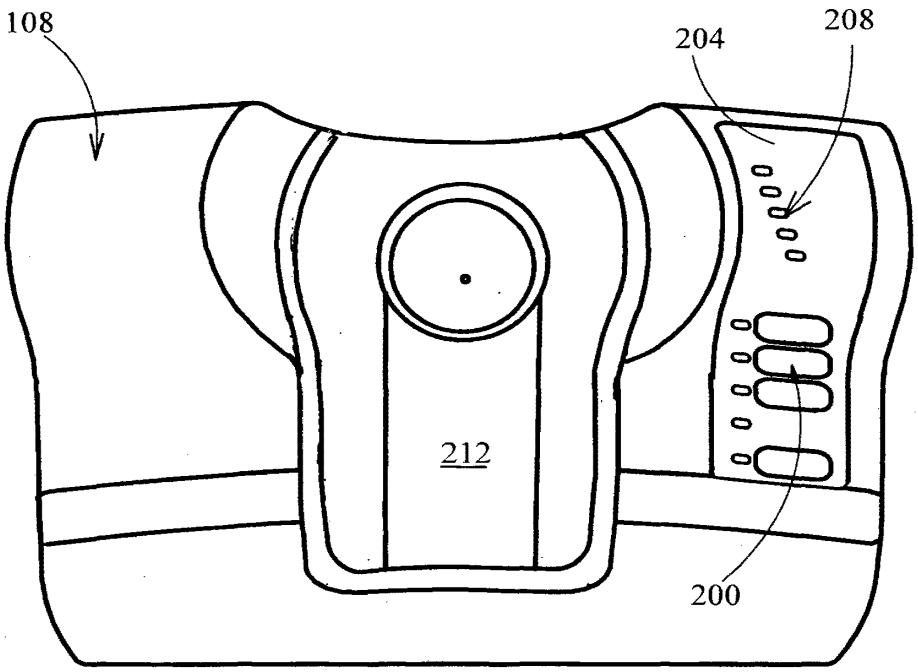


FIG.2

Petitioner Therabody Ex-1004, 0658

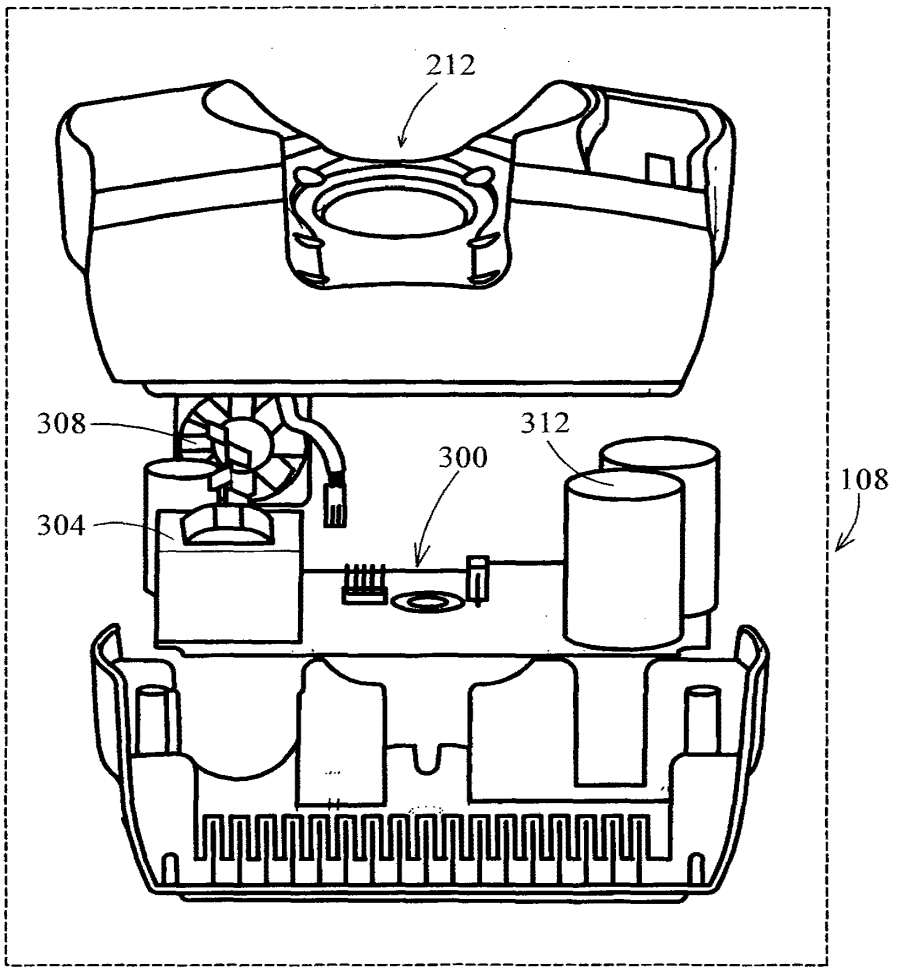


FIG. 3

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VIEW E

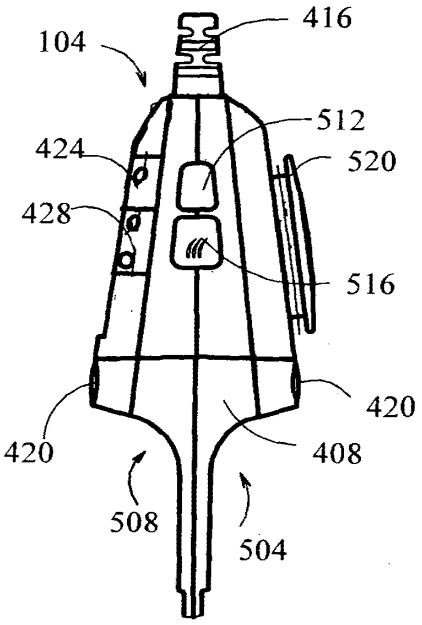


FIG. 5

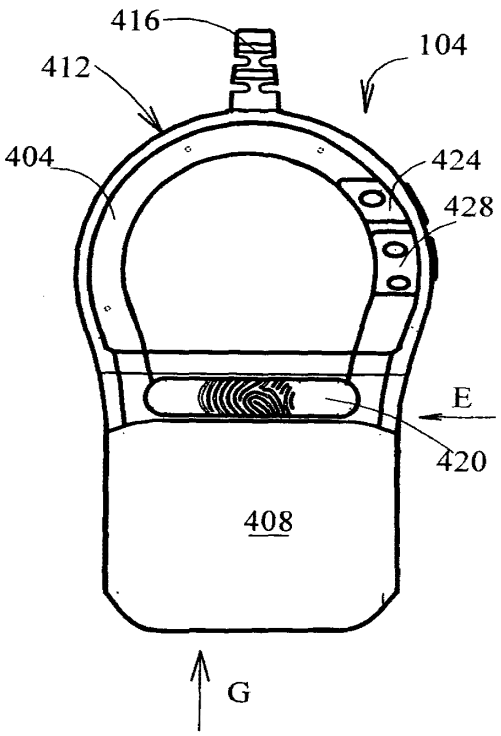


FIG. 4

VIEW G

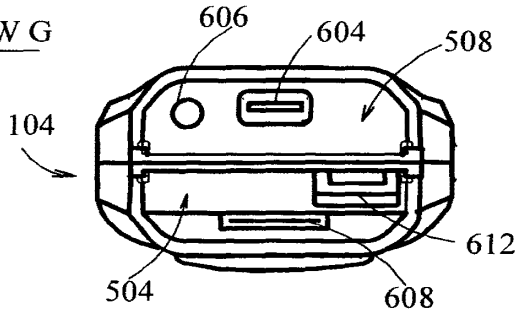


FIG. 6

Petitioner Therabody Ex-1004, 0660

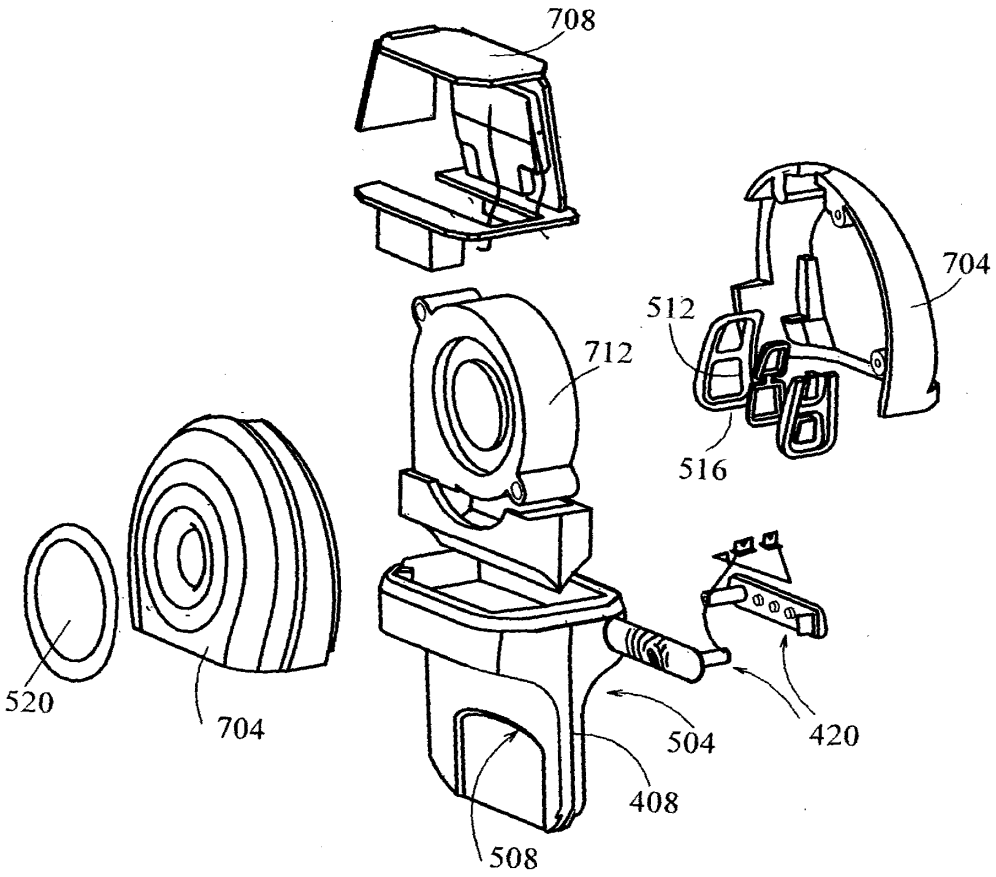


FIG. 7

Petitioner Therabody Ex-1004, 0661

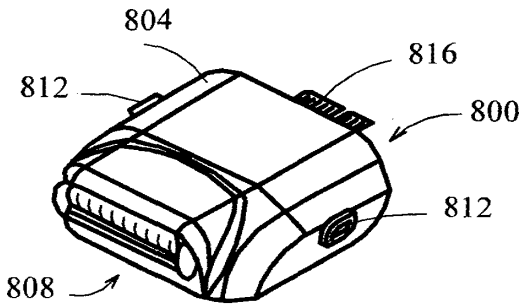


FIG. 8

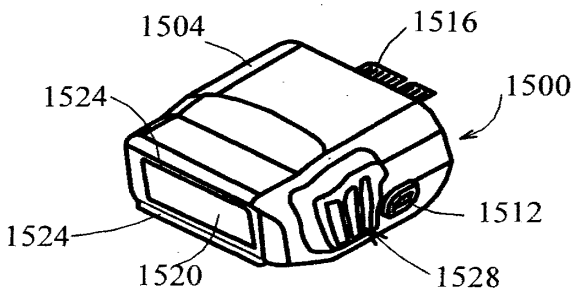


FIG. 15

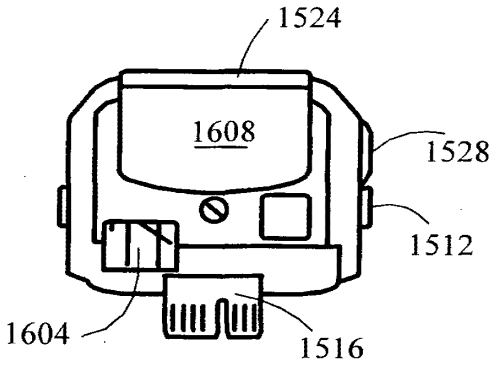


FIG. 16

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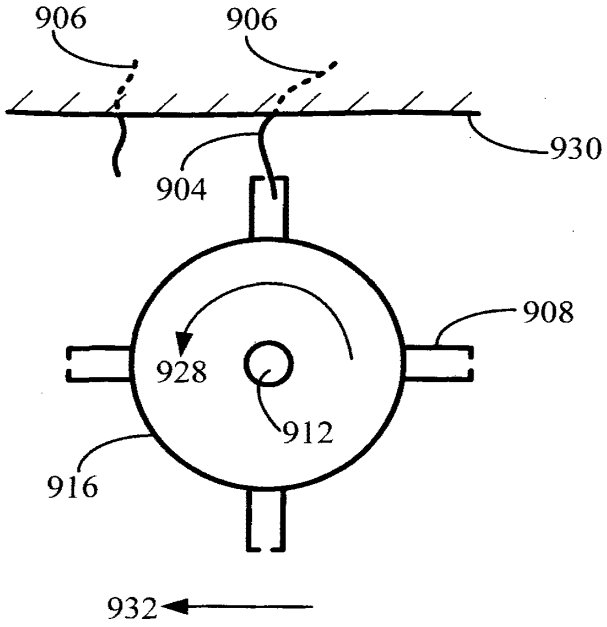


FIG. 9

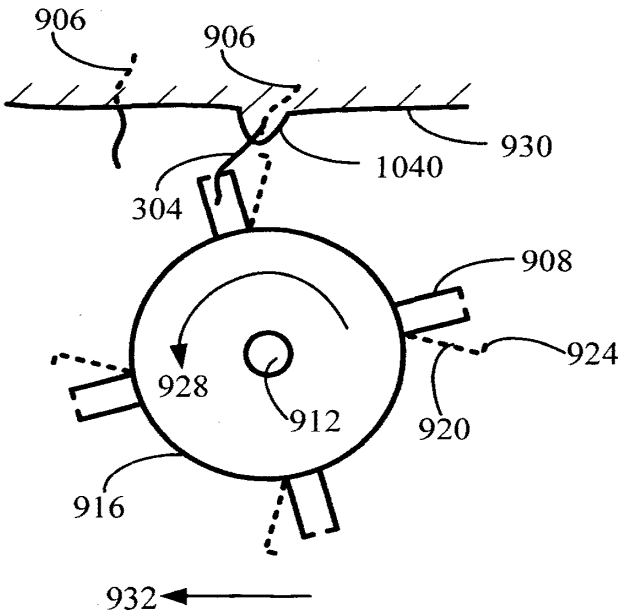


FIG. 10

Petitioner Therabody Ex-1004, 0663

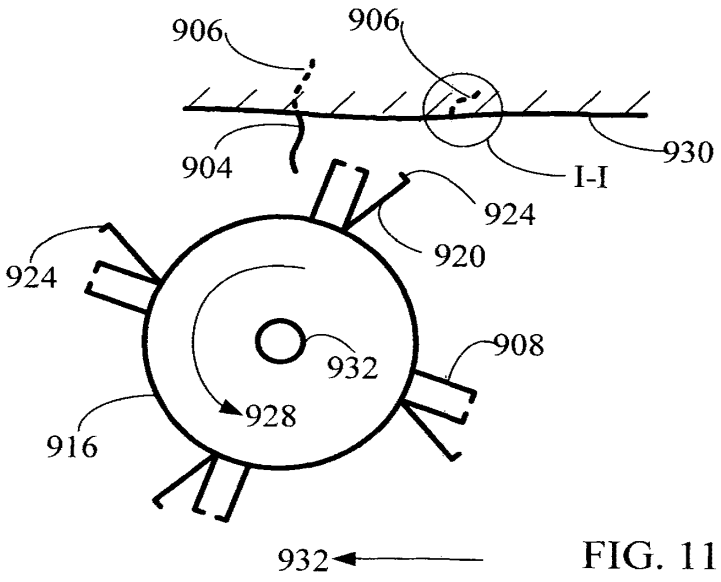


FIG. 11

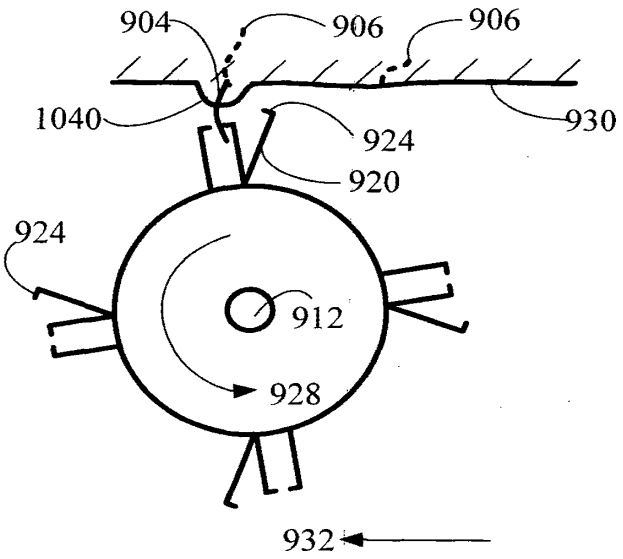


FIG. 12

Petitioner Therabody Ex-1004, 0664

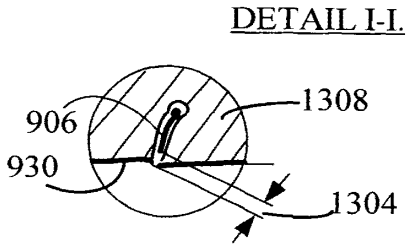


FIG. 13

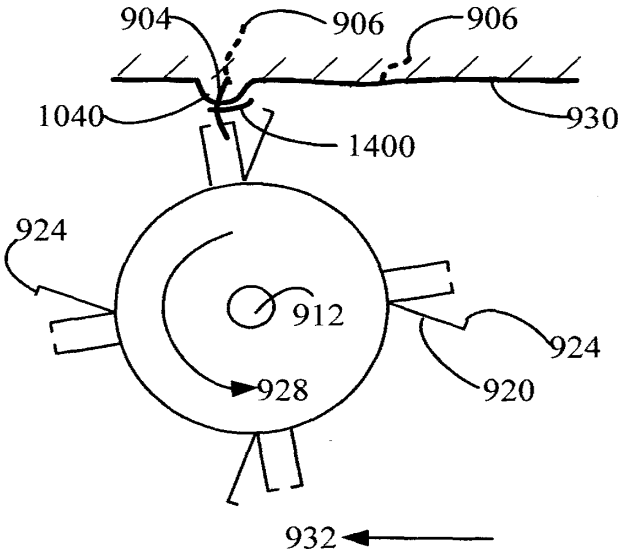


FIG. 14

Petitioner Therabody Ex-1004, 0665

SECTION D-D

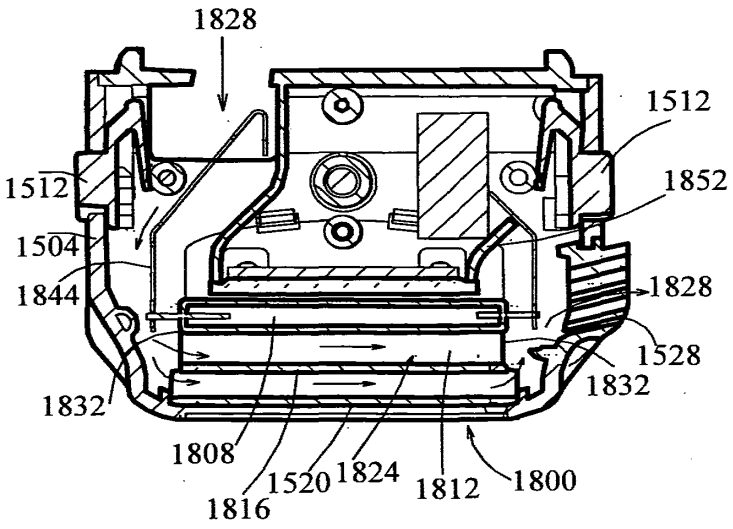


FIG. 18

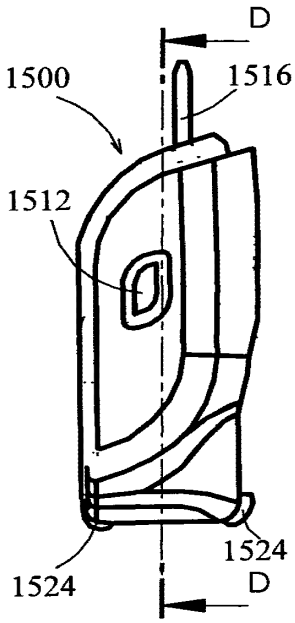


FIG. 17

Petitioner Therabody Ex-1004, 0666

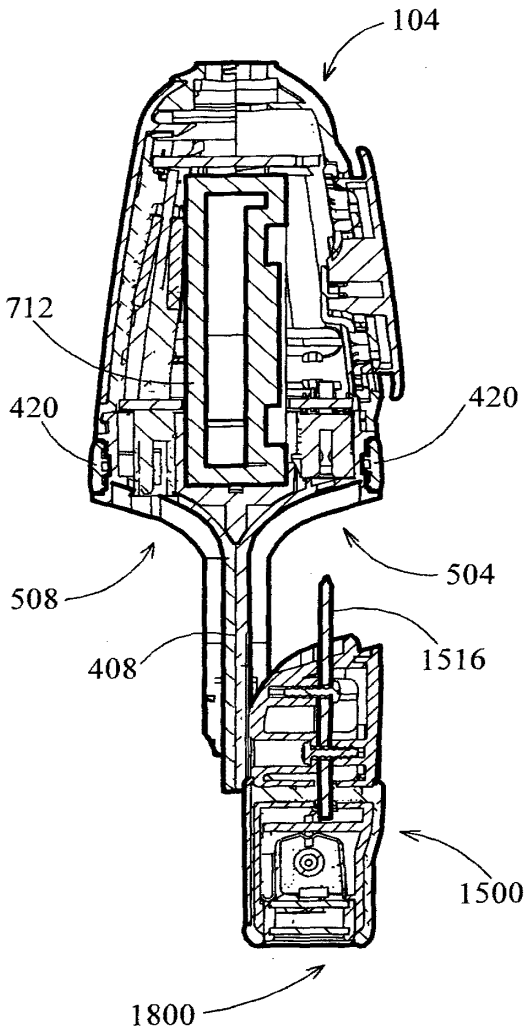


FIG. 19

Petitioner Therabody Ex-1004, 0667

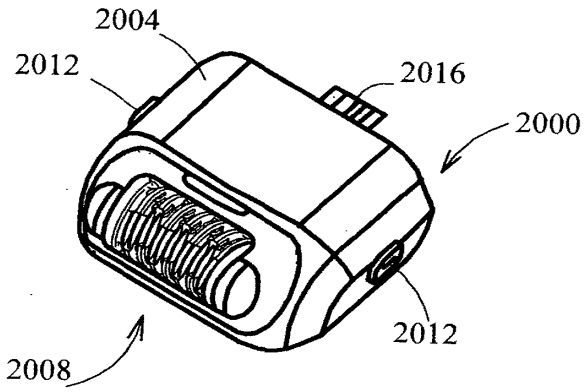


FIG. 20

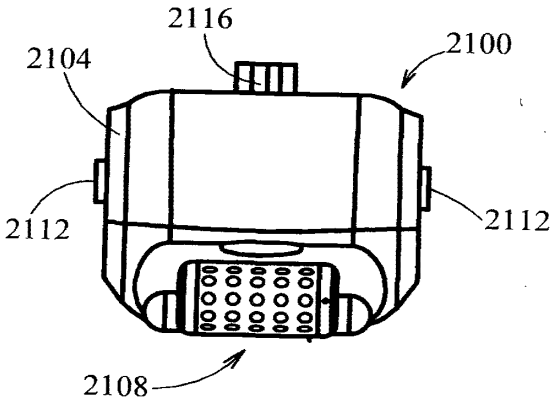


FIG. 21

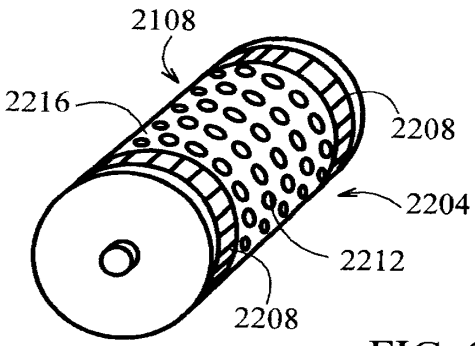


FIG. 22

Petitioner Therabody Ex-1004, 0668

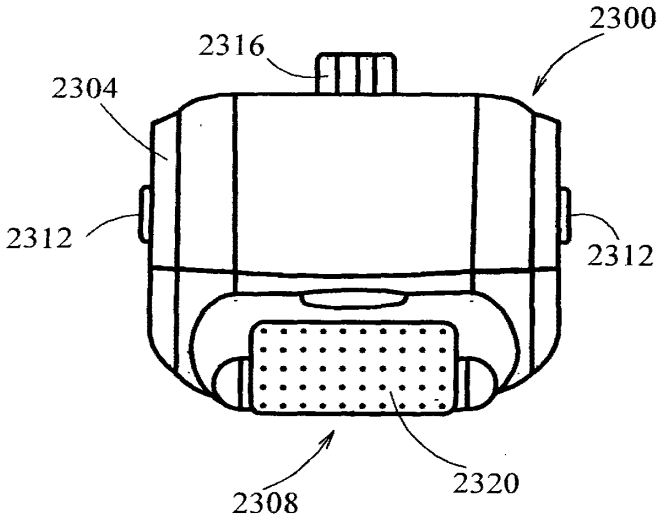


FIG. 23

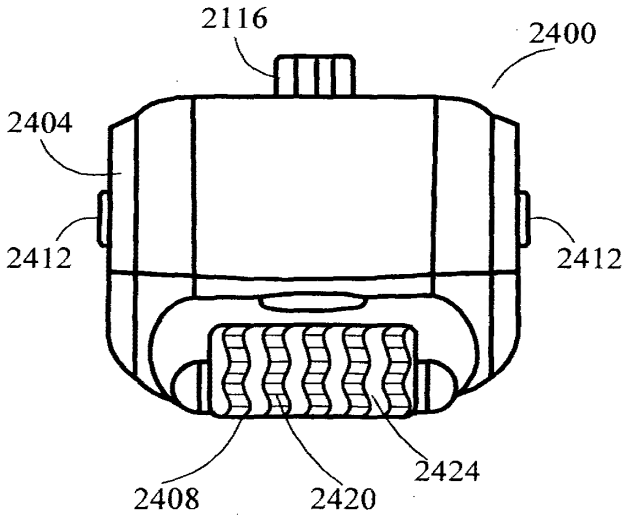


FIG. 24

Petitioner Therabody Ex-1004, 0669

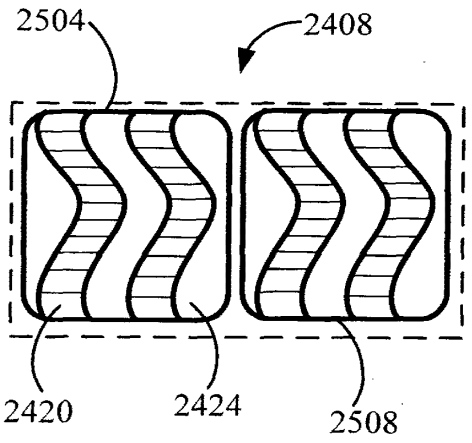


FIG. 25A

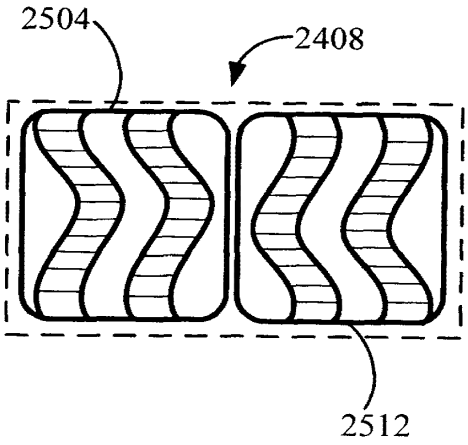


FIG. 25B

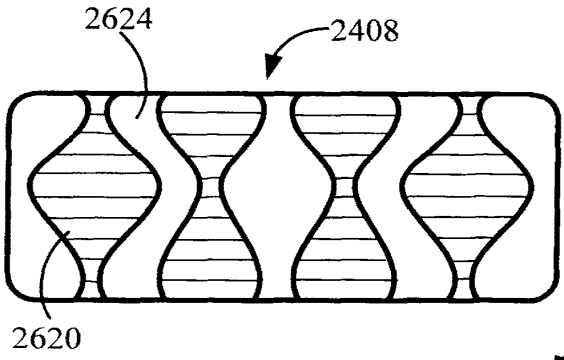


FIG. 26A

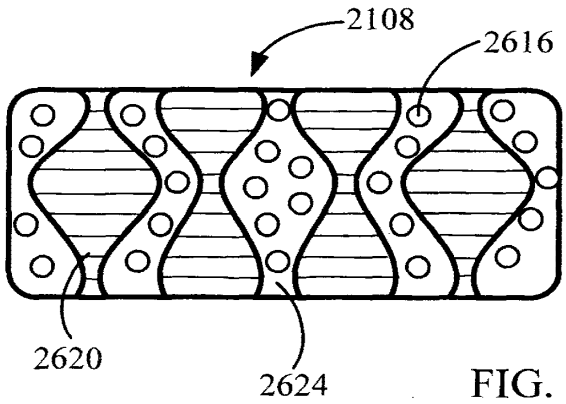


FIG. 26B

Petitioner Therabody Ex-1004, 0670

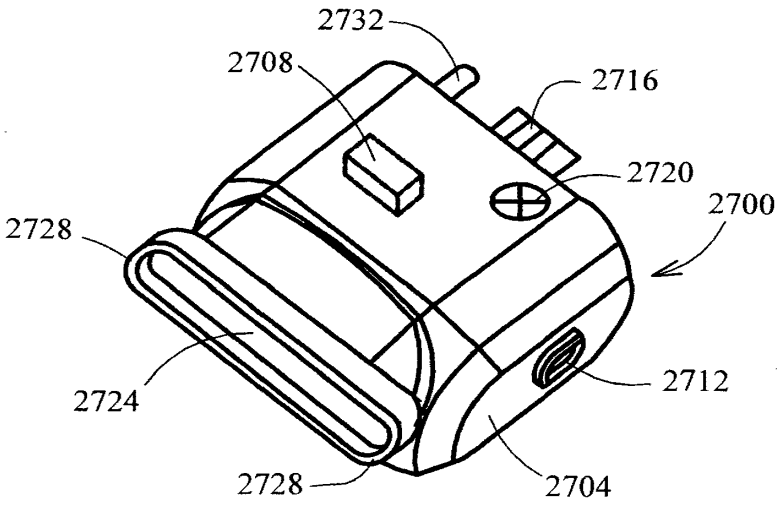


FIG. 27

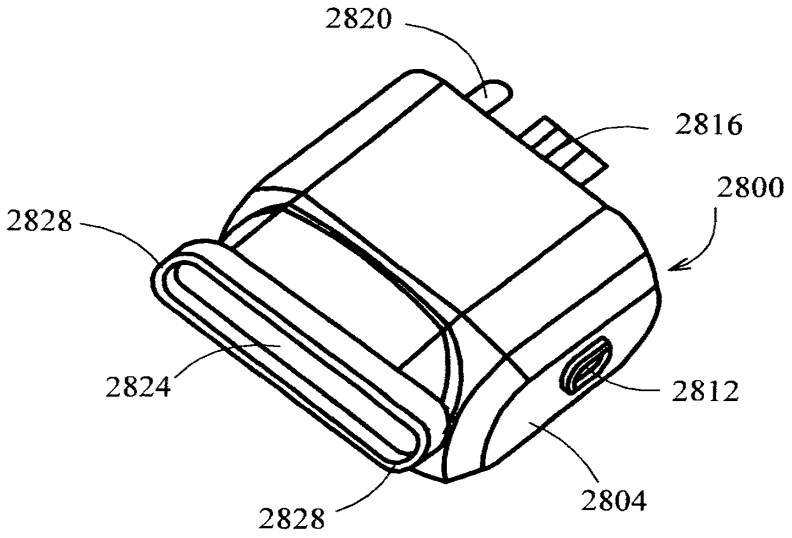


FIG. 28

Petitioner Therabody Ex-1004, 0671

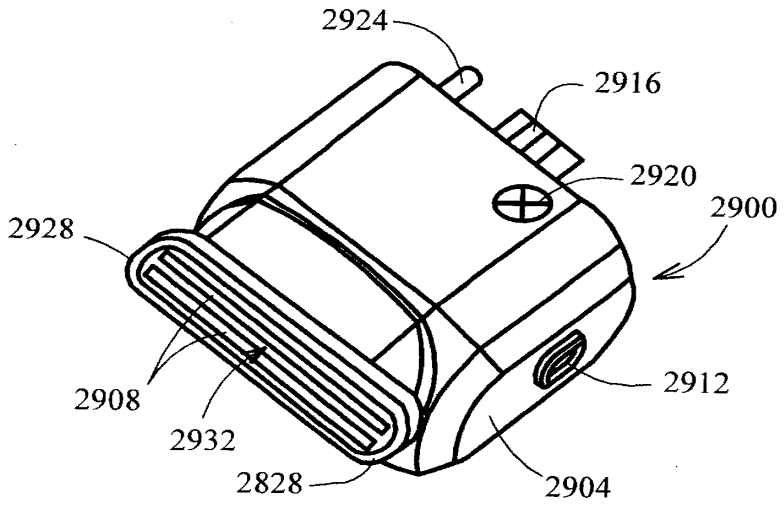


FIG. 29

Petitioner Therabody Ex-1004, 0672

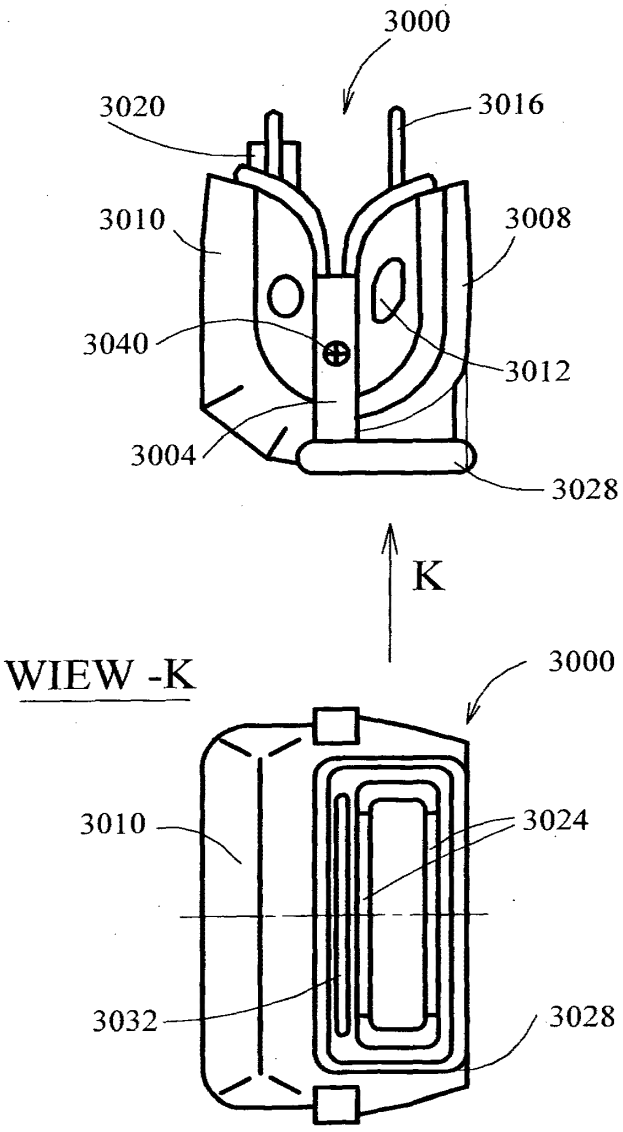


FIG. 30

Petitioner Therabody Ex-1004, 0673

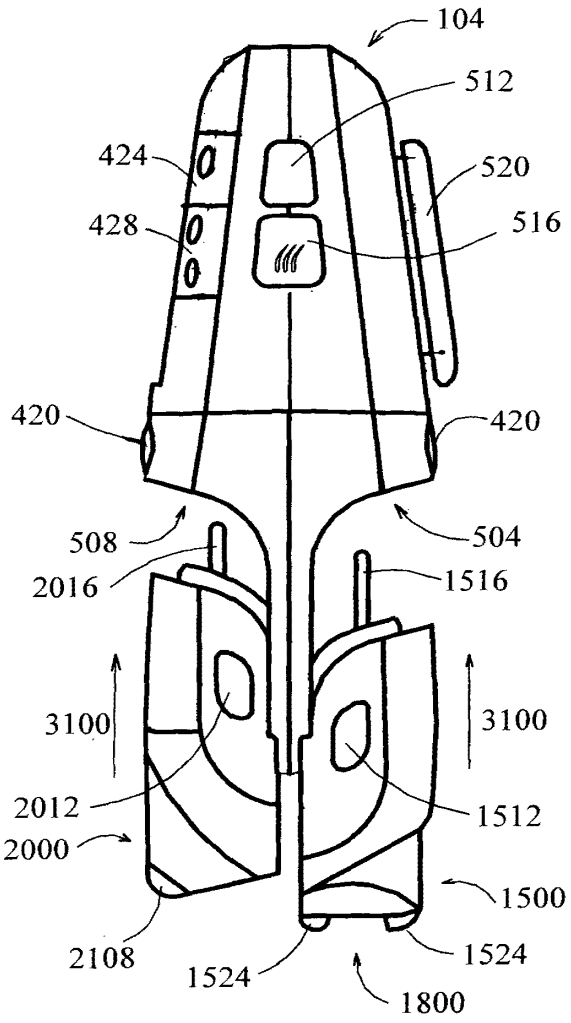


FIG. 31

Petitioner Therabody Ex-1004, 0674

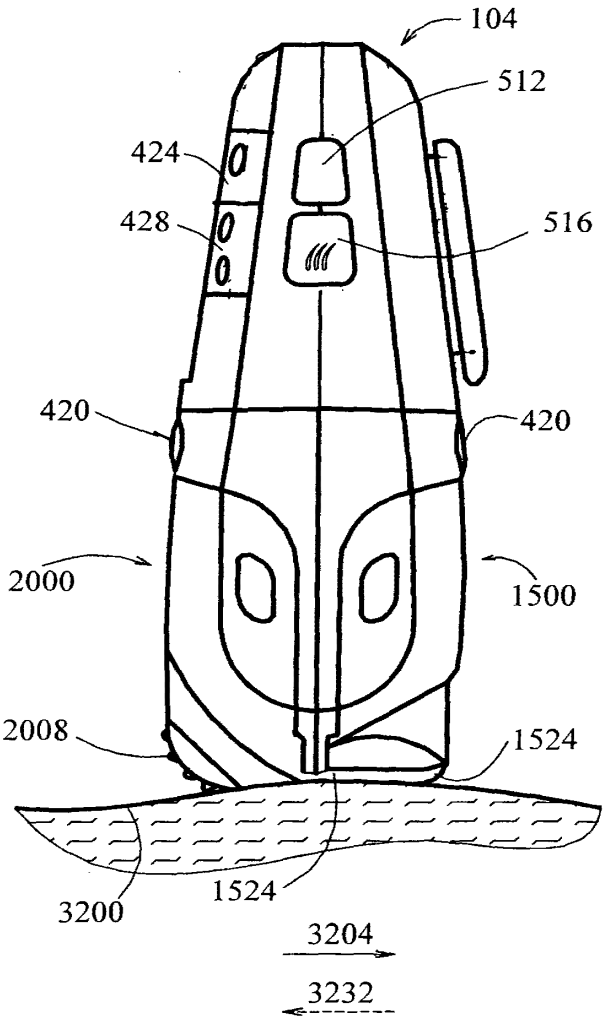


FIG. 32

Petitioner Therabody Ex-1004, 0675

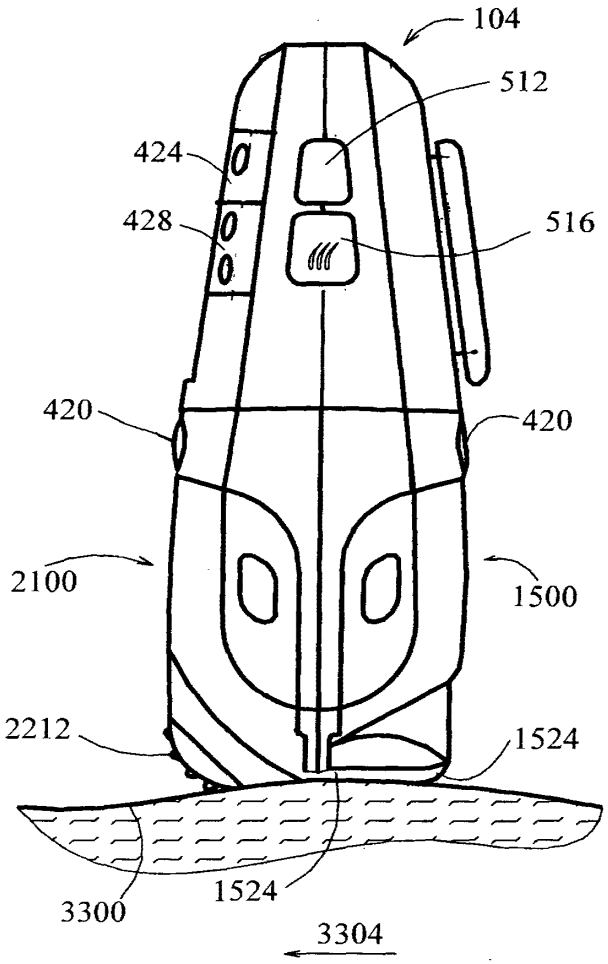


FIG. 33

Petitioner Therabody Ex-1004, 0676

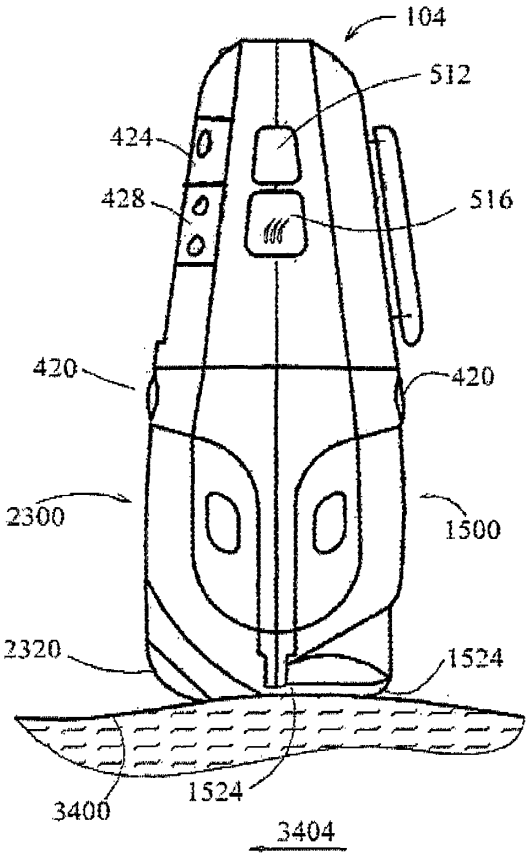


FIG. 34

Petitioner Therabody Ex-1004, 0677

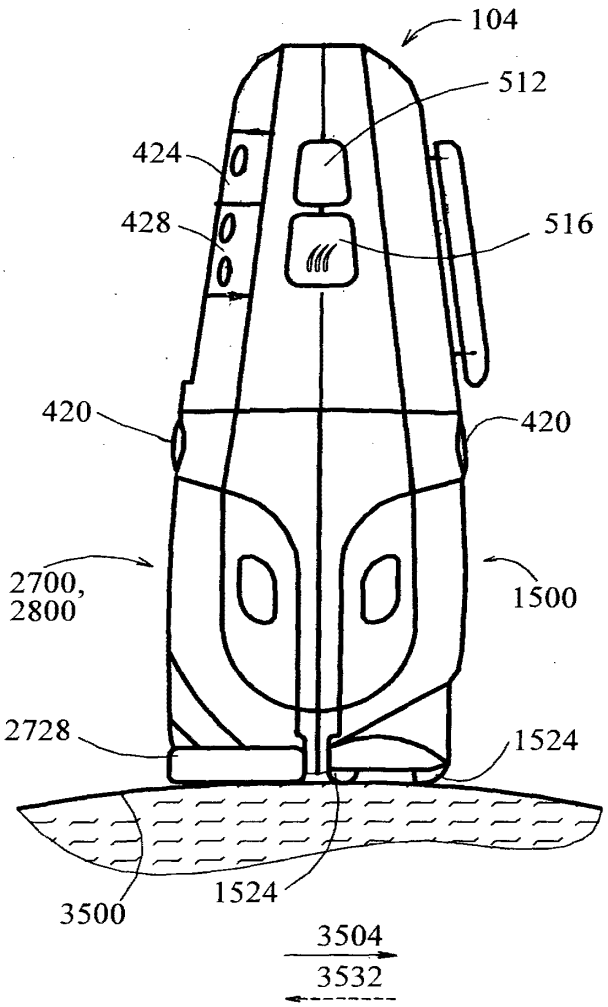


FIG. 35

Petitioner Therabody Ex-1004, 0678

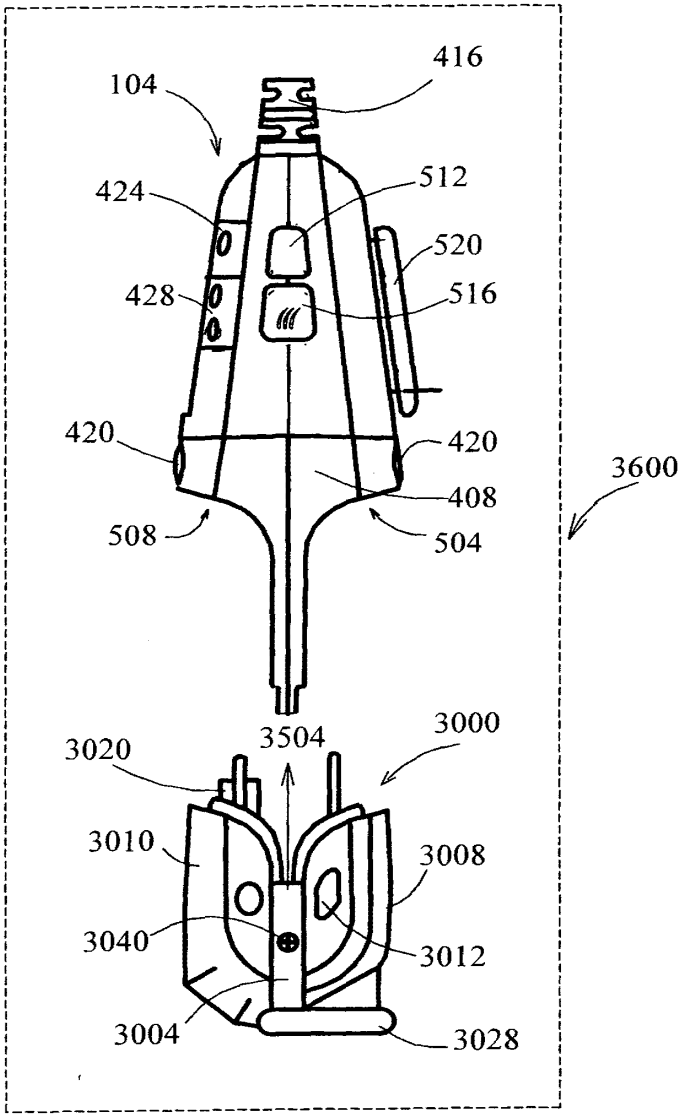


FIG. 36

Petitioner Therabody Ex-1004, 0679

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2009090632 A **[0007]**
- US 50557609 A **[0052]**
- WO 61248997 A **[0060]**

Non-patent literature cited in the description

- **BRUCE M FREEDMAN.** Topical antioxidant application augments the effects of intense pulsed light therapy. *Journal of Cosmetic Dermatology,* 2009, vol. 8, 254-259 **[0079]**

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CLAIMS

1. A treatment device, comprising:

a body provided with a processing unit and a power source; and

a plurality of energy generator elements being independently operable to convert electricity from the power source into a plurality of different energy types transmittable towards an area of skin of a user, the plurality of energy generator elements being arranged coaxially about an axis,

wherein the body includes a grip arranged to be grasped by a hand of the user applying a gripping force to maintain the plurality of energy generator elements on or adjacent the area of skin.

2. The treatment device of claim 1, wherein the plurality of energy generator elements includes a first energy generator element and a second energy generator element, and wherein the first energy generator element is an impact generator element that is linearly actuatable along the axis to contact the area of skin.

3. The treatment device of claim 2, wherein the impact generator element includes a drive mechanism, a piston, and tissue contacting member, wherein the drive mechanism is operably coupled to a controller that directs electricity to the drive mechanism to move the piston and along the axis.

4. The treatment device of claim 2, wherein the second energy generator element is substantially ring shaped and arranged coaxially about the first energy generator element.

5. The treatment device of claim 2, wherein the second energy generator element includes a reflecting groove circumferentially arranged about the axis, the reflecting groove defining a concave shape arranged to reflect a second energy type towards the area of skin.

6. The treatment device of claim 1, wherein the plurality of energy generator elements includes:

a heat generator element;

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an impact generator element; and/or

a pressure generator element.

7. The treatment device of claim 1, wherein the plurality of different energy types includes:

a heat flux directed toward the area of skin;

an impact force applied to the area of skin; and/or

a pressure force applied to the area of skin.

8. The treatment device of claim 1, wherein at least one of the plurality of energy generator elements is contained within a housing that is removably securable to the body.

9. A treatment device, comprising:

a body provided with a sensor, a power source, and a processing unit configured to receive input data and generate a control signal based on the input data, the body further including a skin contacting surface maintainable against skin of a user by a force applied by a hand of a user when gripping the body; and

a first energy generator element and a second energy generator element coupled to the body, the first and second energy generator elements being independently operable to convert electricity from the power source into a first energy type and a second energy type, respectively, and direct the first and second energy types toward an area of skin, the first energy generator element including an impact generator element that is linearly actuatable along an axis to output an impact force against the area of skin,

wherein the sensor is configured to detect additional input data based on a vital sign of the user and transmit the input data for display.

10. The treatment device of claim 9, wherein the additional input data corresponds to a heart rate of the user.

11. The treatment device of claim 9, further comprising a controller configured to modify intensity of the first energy type and the second energy type.

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12. The treatment device of claim 9, wherein a portion of the body configured to be gripped by the hand of the user is configured to emulate a grip of a gun.

13. The treatment device of claim 9, wherein the impact generator element includes a drive mechanism, a piston, and a tissue contacting member, wherein the drive mechanism is operably coupled to a controller to direct electricity to the drive mechanism and move the piston along the axis.

14. The treatment device of claim 9, wherein the second energy generator element is a heat generator element configured to output a second energy type including a heat flux toward the area of skin.

15. The treatment device of claim 14, wherein the heat generator element is arranged coaxially about the axis.

16. The treatment device of claim 14, further comprising a third energy generator element independently operable of the first and second energy generator elements to output a third energy type toward the area of skin.

17. The treatment device of claim 16, further comprising a controller configured to modify an intensity of the first, second, and third energy types.

18. A treatment device, comprising:

a body provided with a power source and a processing unit configured to receive input data and generate a control signal based on the input data, the body including a skin contacting surface maintainable against skin of a user by a force applied by a hand of the user when gripping the body; and

a first energy generator element and a second energy generator element coupled to the body, the first and second energy generator elements being independently operable to convert electricity from the power source into a first energy type and a second energy type, respectively, and direct the first and second energy types toward an area of skin, the first energy generator

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element including an impact generator element that is linearly actuatable along an axis to output the first energy type including an impact force against the area of skin;

wherein the processing unit is operable to output an optical signal on a display that is observable by eyes of the user, the output corresponding to the control signal.

19. The treatment device of claim 18, wherein a portion of the body configured to be gripped by the hand of the user is configured to emulate a grip of a gun.

20. The treatment device of claim 18, further comprising a sensor to detect additional input data based on a vital sign of the user, the additional input data corresponding to heart rate of the user.

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ABSTRACT KR101319429B1

The present invention relates to an air mattress device integrated with a suction device, and is intended to prevent bedsores by applying negative pressure stimulation to body parts in contact with the air mat. For this purpose, the present invention is an air mat that forms a plurality of air pockets and is integrated with a suction device capable of applying negative pressure stimulation to the skin contact surface in contact with the surface of the air pocket, and air injection into the air pockets in the air mat. and an air/suction control unit that controls the air discharge operation of the suction machine, respectively, to provide an air mattress device integrated with a suction machine, which improves blood circulation in body parts in contact with the air mat to ensure smooth oxygen supply to tissues and contraction of muscle tissue. /It promotes metabolism and increases cell activity through relaxation, thereby preventing the occurrence of bedsores.

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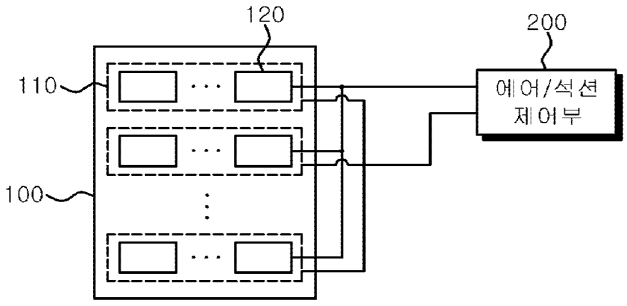
(54) 발명의 명칭 **석션기 일체형 에어매트리스 장치**

(57) 요 약

본 발명은 석션기 일체형 에어매트리스 장치에 관한 것으로, 에어매트와 접촉되는 신체 부위에 음압 자극을 인가하여 욕창을 방지하기 위한 것이다.

이를 위하여 본 발명은, 다수 개의 공기 주머니를 형성하고 공기 주머니의 표면과 접촉하는 피부 접촉면에 음압 자극을 인가할 수 있는 석션기가 일체로 내장되어 구성되는 에어매트, 에어매트 내 공기 주머니로의 공기 주입 및 석션기의 공기 배출 동작을 각각 조절하는 에어/석션 제어부를 포함하는 석션기 일체형 에어매트리스 장치를 제공하여, 에어매트와 접촉되는 신체 부위의 혈액순환을 증진시켜 조직의 산소공급을 원활하게 하고 근조직의 수축/이완을 통한 신진대사의 촉진 및 세포활성도의 증대시킬 수 있게 하여 욕창의 발생을 미연에 방지할 수 있게 한다.

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특허청구의 범위

청구항 1

다수 개의 공기 주머니를 형성하고, 공기 주머니의 표면과 접촉하는 피부 접촉면에 음압 자극을 인가할 수 있는 석션기가 일체로 내장되어 구성되는 에어매트;

상기 에어매트의 공기 주머니로의 공기 주입 및 석션기의 공기 배출 동작을 각각 조절하는 에어/석션 제어부;를 포함하는 것을 석션기 일체형 에어매트리스 장치에 있어서,

상기 에어/석션 제어부는,

공기 분배관을 통해 상기 각각의 공기 주머니로 공기를 개별적으로 주입하며, 공기 흡입관을 통해 상기 각 석션기의 공기를 흡입하는 주입/흡입 일체형 펌프를 포함하여 구성되는 것을 특징으로 하는 선석기 일체형 에어매트리스 장치.

청구항 2

다수 개의 공기 주머니를 형성하고, 공기 주머니의 표면과 접촉하는 피부 접촉면에 음압 자극 및 열적 자극을 인가할 수 있는 석션기가 일체로 내장되어 구성되는 에어매트;

상기 에어매트 내 공기 주머니로의 공기 주입 및 석션기의 공기 배출 동작과 열적 자극을 위한 건조/온열 조건을 각각 조절하는 에어/석션 제어부를 포함하는 석션기 일체형 에어매트리스 장치에 있어서,

상기 에어/석션 제어부는,

공기 분배관을 통해 상기 각각의 공기 주머니로 공기를 개별적으로 주입하며, 공기 흡입관을 통해 상기 각 석션기의 공기를 흡입하는 주입/흡입 일체형 펌프를 포함하여 구성되는 것을 특징으로 하는 선석기 일체형 에어매트리스 장치.

청구항 3

삭제

청구항 4

제1항 또는 제2항 중 어느 한 항에 있어서, 상기 에어매트는,

상기 공기 주머니로의 공기 주입과 상기 석션기의 공기 배출을 위한 공기 주입구 및 공기 흡입구가 독립적으로 각각 형성되는 것을 특징으로 하는 선석기 일체형 에어매트리스 장치.

청구항 5

제1항 또는 제2항 중 어느 한 항에 있어서, 상기 에어매트는,

하나의 공기 주머니에 복수 개의 석션기가 내장되는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 6

제1항에 있어서, 상기 석션기는,

플랙서블 재질로 형성되며 컵의 전면 개방부가 상기 에어매트의 일측 표면을 향하도록 하여 각각의 공기 주머니에 내설되는 석션컵;

상기 석션컵의 후방에 형성되며 상기 석션컵 내부의 공기 배출 및 전원선 인출을 위한 공기 배출구;를 포함하여 구성되는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 7

제6항에 있어서, 상기 석션기는,

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공기 유입이 가능한 재질로 이루어지며, 음압에 의한 과도한 피부 팽창 및 피부 밀림을 제한할 수 있도록 상기 석션컵의 전면 개방부 내측으로 삽입되어 설치되는 피부함몰 방지부재;를 더 포함하는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 8

제7항에 있어서, 상기 석션기는,

상기 석션컵의 전면 개방부의 내주면 가장자리를 따라 원주방향으로 다수 개 설치되어 상기 피부함몰 방지부재를 정위치시키는 지지부재;를 더 포함하여 구성되는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 9

제2항에 있어서, 상기 석션기는,

플렉서블 재질로 형성되며 컵의 전면 개방부가 상기 에어매트의 일측 표면을 향하도록 하여 각각의 공기 주머니에 내설되는 석션컵;

상기 석션컵의 후방에 형성되며 상기 석션컵 내부의 공기 배출 및 전원선 인출을 위한 공기 배출구;

상기 석션컵의 전면 개방부를 향하여 빛을 방출하도록 상기 석션컵의 내부에 설치되어 상기 석션컵 내부의 피부 접촉면에 피부 건조 및 온열 자극을 위한 빛을 방출하는 온열/건조부재;를 포함하여 구성되는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 10

제9항에 있어서,

상기 온열/건조부재는 하나 이상의 원적외선 다이오드로 구성되는 것을 석션기 일체형 에어매트리스 장치.

청구항 11

제9항에 있어서, 상기 석션기는,

공기 유입이 가능한 재질로 이루어지며, 상기 온열/건조부재가 지지 및 고정되고 음압에 의한 과도한 피부 팽창 및 피부 밀림을 제한할 수 있도록 상기 석션컵의 전면 개방부 내측으로 삽입되어 설치되는 피부함몰 방지부재;를 더 포함하는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 12

제11항에 있어서, 상기 석션기는,

상기 석션컵의 전면 개방부의 내주면 가장자리를 따라 원주방향으로 다수 개 설치되어 상기 피부함몰 방지부재를 정위치시키는 지지부재;를 더 포함하여 구성되는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 13

제1항 또는 제2항 중 어느 한 항에 있어서, 상기 에어/석션 제어부는,

상기 다수 개의 공기 주머니에 공기를 주입하는 동작을 미리 정해진 순서에 따라 순차적으로 실시하는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

청구항 14

제1항 또는 제2항 중 어느 한 항에 있어서, 상기 에어/석션 제어부는,

상기 각 석션컵으로부터 공기를 배출시키는 동작을 미리 정해진 순서에 따라 순차적으로 실시하는 것을 특징으로 하는 석션기 일체형 에어매트리스 장치.

명 세 서

기 술 분 야

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[0001] 본 발명은 석션기 일체형 에어매트리스 장치에 관한 것으로, 보다 상세하게는 에어매트에 음압 조절이 가능한 석션기를 일체로 적용하여 에어매트와 접촉되는 신체 부위의 음압을 조절할 수 있도록 함으로써 혈액순환을 증진시켜 조직의 산소공급을 원활하게 하고 근조직의 수축/이완을 통한 신진대사의 촉진 및 세포활성도의 증대시켜 욕창발생을 방지할 수 있는 석션기 일체형 에어매트리스 장치에 관한 것이다.

배 경 기 술

[0002] 일반적으로 욕창은 일상생활의 대부분을 누워서 생활하여야 하는 환자들에게 주로 발생하는 것으로, 이러한 환자들의 대부분은 자세 변경이 어렵기 때문에 누운 자세에서 체중이 집중되는 등이나 엉덩이 부위에 국부적으로 체중에 의한 압력을 받게 되며, 이러한 과정에서 혈액순환의 장애, 또는 습도나 온도 등에 의해 발생되는 피부의 습진 등이 욕창으로 발전하게 된다.

[0003] 이러한 욕창의 발생을 방지하기 위해서 종래에는 국부적으로 가중되는 체중에 의한 압력을 최소화할 수 있도록 공기주머니 또는 유연한 폼으로 성형되어진 욕창방지매트들이 사용되거나, 또는 이러한 욕창방지매트에 호스를 통해 공기를 분사하는 공기분사장치를 적용함으로써 체중에 의한 압력이 가해지는 국소부위에 통기성을 부여하는 장치들이 사용되고 있다.

[0004] 그러나 공기 분사를 통해 통기성을 부여하는 욕창방지매트들은 대부분 바닥면이 막힌 상태에서 공기가 분사되므로 균일한 공기 분사가 이루어지지 못하는 단점이 있으며, 특히 체중에 의한 압력이 가해지는 부분까지 분사 공기가 투입되지 못하게 되므로 실질적으로는 공기분사에 의한 욕창방지의 효과가 미비하게 나타나는 등의 문제점이 있었다.

[0005] 또한 최근에는 각각의 공기주머니를 갖는 욕창방지매트에 공기압을 서로 다르게 변화시켜 주입하는 장치, 즉 누운 상태에서 하중이 많이 가해지는 엉덩이 부분이나 등쪽 부분의 공기주머니에 공기압을 변화시켜 주입하는 장치를 사용함으로써 누운 상태에서도 전체적으로 동일한 압력을 유지토록 하여 욕창을 방지할 수 있게 하였으나, 이러한 장치들도 장시간 밀착될 경우에는 통기가 이루어지지 못하게 되는 문제점이 있었다.

발명의 내용

해결하려는 과제

[0006] 본 발명이 해결하고자 하는 기술적 과제는, 에어매트에 음압 조절이 가능한 석션기를 일체로 적용하여 에어매트와 접촉되는 신체 부위에 음압 자극을 인가할 수 있도록 함으로써 혈액순환을 증진시켜 조직의 산소공급을 원활하게 하는 석션기 일체형 에어매트리스 장치를 제공하고자 하는 것이다.

[0007] 본 발명이 해결하고자 하는 다른 기술적 과제는, 에어매트에 음압 조절이 가능하고 건조/온열 조건이 제공되는 석션기를 일체로 적용하여 에어매트와 접촉되는 신체 부위에 음압 자극 및 열적 자극을 인가할 수 있도록 함으로써 혈액순환을 증진시켜 조직의 산소공급을 원활하게 하고 근조직의 수축/이완을 통한 신진대사의 촉진 및 세포활성도의 증대할 수 있는 석션기 일체형 에어매트리스 장치를 제공하고자 하는 것이다.

과제의 해결 수단

[0008] 상기 목적을 달성하기 위한 본 발명의 일 실시 형태는, 다수 개의 공기 주머니를 형성하고 공기 주머니의 표면과 접촉하는 피부 접촉면에 음압 자극을 인가할 수 있는 석션기가 일체로 내장되어 구성되는 에어매트, 에어매트 내 공기 주머니로의 공기 주입 및 석션기의 공기 배출 동작을 각각 조절하는 에어/석션 제어부를 포함하는 석션기 일체형 에어매트리스 장치이다.

[0009] 상기 목적을 달성하기 위한 본 발명의 다른 실시 형태는, 다수 개의 공기 주머니를 형성하고 공기 주머니의 표면과 접촉하는 피부 접촉면에 음압 자극 및 열적 자극을 인가할 수 있는 석션기가 일체로 내장되어 구성되는 에어매트, 에어매트 내 공기 주머니로의 공기 주입 및 석션기의 공기 배출 동작과 열적 자극을 위한 건조/온열 조건을 각각 조절하는 에어/석션 제어부를 포함하는 석션기 일체형 에어매트리스 장치이다.

발명의 효과

[0010] 본 발명에 따른 석션기 일체형 에어매트리스 장치에 의하면, 에어매트에 음압 조절 및 열적 조건의 제공이 가능한 석션기를 일체로 적용하여 에어매트와 접촉되는 신체 부위에 음압 자극 및 열적 자극을 인가할 수 있으므로, 혈액순환을 증진시켜 조직의 산소공급을 원활하게 하고 근조직의 수축/이완을 통한 신진대사의 촉진 및 세포활

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성도의 증대시킬 수 있게 하여 욕창의 발생을 미연에 방지할 수 있게 된다.

도면의 간단한 설명

[0011] 도 1은 본 발명에 의한 석션기 일체형 에어매트리스 장치의 개략적인 구성을 예시한 블록도이다.

도 2는 본 발명에 의한 석션기 일체형 에어매트리스 장치에서 하나의 공기주머니를 발췌하여 그 내부 구성을 나타낸 참고도이다.

도 3a 내지 도 3d는 도 2의 석션기를 발췌하여 예시한 상세도들이다.

도 4는 본 발명에 의한 석션기 일체형 에어매트리스 장치의 다른 실시예를 설명하기 위하여 예시한 참고도이다.

도 5a와 도 5b는 본 발명의 일 실시 형태에 의한 에어매트리스 장치에서 석션기 동작 전과 동작 후의 피부 상태를 설명하기 위하여 예시한 참고도이다.

도 6은 본 발명에 의한 석션기 일체형 에어매트리스 장치의 사용상태를 예시한 참고도이다.

도 7은 본 발명에 의한 석션기 일체형 에어매트리스 장치의 효과를 설명하기 위하여 예시한 참고도이다.

도 8은 본 발명에 의한 석션기 일체형 에어매트리스 장치의 순차적 제어 동작을 설명하기 위하여 예시한 혈류 개선 모식도이다.

발명을 실시하기 위한 구체적인 내용

[0012] 이하, 본 발명의 일 실시예에 의한 석션기 일체형 에어매트리스 장치의 구성 및 동작을 첨부한 도면을 참조하여 상세히 설명한다.

[0013] 본 명세서 및 청구범위에 사용된 용어나 단어는 통상적이거나 사전적인 의미로 한정 해석되지 아니하며, 발명자는 그 자신의 발명을 가장 최선의 방법으로 설명하기 위해 용어의 개념을 적절하게 정의할 수 있다는 원칙에 입각하여 본 발명의 기술적 사상에 부합하는 의미와 개념으로 해석되어야만 한다. 따라서, 본 명세서에 기재된 실시예와 도면에 도시된 구성은 본 발명의 가장 바람직한 일 실시예에 불과할 뿐이므로, 본 출원시점에 있어서 이들을 대체할 수 있는 다양한 균등물과 변형예들이 있을 수 있음을 이해하여야 한다.

[0014] 도 1은 본 발명에 의한 석션기 일체형 에어매트리스 장치의 개략적인 구성을 예시한 블록도이고, 도 2는 본 발명에 의한 석션기 일체형 에어매트리스 장치에서 하나의 공기주머니를 발췌하여 그 내부 구성을 나타낸 참고도이며, 도 3a 내지 도 3d는 도 2의 석션기를 분해하여 각각 예시한 상세도들이다.

[0015] 도 1에 도시된 바와 같이 본 발명의 각 실시 형태에 따른 석션기 일체형 에어매트리스 장치는, 에어매트(100)와 에어/석션 제어부(200)로 구성된다.

[0016] 에어매트(100)는 다수 개의 공기 주머니(110)가 나란하게 배열되어 형성되고, 각각의 공기주머니(110)에는 에어매트의 표면과 접촉하는 피부의 접촉면에 음압 자극, 또는 음압 자극과 열적 자극을 동시에 인가할 수 있는 석션기(120)가 일체로 내장되어 구성된다. 이 에어매트(100)는 도 2에 도시된 바와 같이 공기 주머니(110)로의 공기 주입을 위한 공기 주입구(111)와 석션기(120)의 공기 배출을 위한 공기 흡입구(112)가 독립적으로 각각 형성되며, 하나의 공기 주머니(110)에는 복수 개의 석션기(120)가 좌우로 대칭되게 내장되어 구성되고, 하나의 공기 주머니에 내장되어 있는 복수 개의 석션기(120)에는 에어/석션 제어부(200)에서 제공되는 제어신호에 의해 동시에 구동되도록 신호선이 연결된다.

[0017] 다수 개의 공기 주머니(110)는 좌우로 배열되어 형성되고 각각 독립적인 공기주입 및 배출이 이루어지도록 공기 주입구(111)와 공기 흡입구(112)가 서로 분리되어 형성된다. 또한 도 2에 도시된 바와 같이 공기 주입구(111)에는 공기 분배관을 통해 공기 탱크에서 공기가 주입되고 공기 흡입구(112)에는 공기 흡입관이 연결되어 이 공기 흡입관을 통해 에어/석션 제어부(200)의 진공 펌프로 연결된다.

[0018] 석션기(120)는, 도 3a 내지 도 3d에 예시된 바와 같이 본 발명의 일 실시 형태를 구현하기 위하여 석션컵(121), 공기배출구(122), 피부함몰 방지부재(124), 및 지지부재(125)를 포함하여 구성될 수 있으며, 또는 본 발명의 다른 실시 형태를 구현하기 위하여 석션컵(121), 공기배출구(122), 온열/건조부재(123), 피부함몰 방지부재(124), 및 지지부재(125)를 포함하여 구성될 수도 있다.

[0019] 석션컵(121)은 플렉서블 재질, 예를 들면 실리콘 재질로 형성되어 설정된 음압보다 높은 음압이 인가되는 경우

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석션컵 자체가 변형을 일으켜서 석션컵의 내부 부피를 줄임으로써 피부에 인가되는 음압을 줄일 수 있도록 구성된다. 이하의 본 발명에서는 욕창환자의 피부 특성을 반영하여 설정 음압이 50㎜Hg로 제한된 경우를 예로 들어 설명하기로 한다. 그러나, 이 값은 초기 설정치에 따라 달라질 수 있다. 또한 석션컵(121)은 그 전면 개방부가 에어매트의 일측 표면을 향하도록 각각의 공기 주머니(110)의 내부에 내설된다.

[0020] 공기 배출구(122)는 석션컵(121)의 후방에 형성되며 석션컵 내부의 공기 배출 기능 및 석션컵 내부로의 전원선 인입/인출을 위해 사용된다. 각 석션컵에 형성된 공기배출구(122)에는 공기 흡입관이 연결되며, 이를 통해 각 공기 주머니에 형성된 공기 흡입구(112)를 거쳐 에어/석션 제어부(200)의 진공 펌프로 연결된다.

[0021] 온열/건조부재(123)는 하나 이상의 원적외선 발광다이오드로 구성되며, 석션컵(121)의 전면 개방부를 향하여 빛을 방출할 수 있도록 석션컵의 내부에 설치되어 석션컵 내부의 피부 접촉면에 피부 건조 및 온열 자극을 위한 빛을 방출한다.

[0022] 피부함몰 방지부재(124)는 공기 유입이 가능하고 피부에 물리적인 자극을 주지 않는 재질, 바람직하게는 스폰지로 이루어지며, 하나 이상의 온열/건조부재(123)가 그 내부에 삽입되어 지지 및 고정된다. 이 피부함몰 방지부재(124)는 석션컵 내부의 음압에 의한 과도한 피부 팽창 및 피부 밀림을 제한할 수 있도록 석션컵(121)의 전면 개방부 내측으로 삽입되어 설치된다. 특히 온열/건조부재로서 원적외선 발광다이오드가 석션컵의 내부에 설치되는 경우에 이 피부함몰 방지부재(124)는 발광다이오드를 몸체 내부에 삽입시켜 지지할 수 있도록 충분한 두께를 갖는 것이 바람직하다.

[0023] 지지부재(125)는 피부함몰 방지부재(124)를 석션컵 내부에서 정위치 및 이탈 방지를 위해 사용되며, 석션컵(121)의 전면 개방부의 내주면 가장자리를 따라 원주방향으로 일정 거리 이격되어 다수 개 설치된다. 도 3b에서는 세 개의 지지부재가 설치된 경우를 예로 들어 도시하고 있으나, 이에 한정되는 것은 아니다.

[0024] 에어/석션 제어부(200)는 에어매트(100) 내 각각의 공기 주머니(110)로의 공기 주입과 석션기(120)의 공기 배출 동작, 또는 공기 주머니(110)로의 공기 주입과 석션기(120)의 공기 배출 동작 및 열적 자극을 위한 건조/온열 조건을 각각 조절할 수 있도록 구성되며, 또한 자극을 원하는 부위, 부위별 구동 순서 및 자극 강도(예를 들면 욕창 환자인 경우 10~50㎜Hg)를 각각 선택하여 조절할 수 있도록 구성된다. 따라서 에어/석션 제어부(200)에서는 임의로 설정한 자극 부위, 부위별 순서 및 자극 강도에 따라 상기 다수 개의 공기 주머니(110)에 공기를 주입하는 동작 및 각 석션기(120)로부터 공기를 배출시키는 동작을 순차적으로 실시하여 원하는 자극 강도로 원하는 부위에 자극을 인가할 수 있게 된다. 여기서 에어/석션 제어부(200)는, 공기 분배관을 통해 상기 각각의 공기 주머니(110)로 공기를 개별적으로 주입하며 공기 흡입관을 통해 상기 각 석션기(120)의 공기를 흡입하는 전자동 주입/흡입 일체형 펌프를 포함하여 구성할 수도 있다. 물론 이 주입/흡입 일체형 펌프는 에어/석션 제어부와는 별도로 구비될 수도 있다.

[0025] 도 4는 본 발명에 의한 석션기 일체형 에어매트리스 장치의 다른 실시예를 설명하기 위하여 예시한 참고도로서, 도면에 도시된 바와 같이 각각의 공기 공기 주머니(110)에는 석션기(120)가 설치된 방향으로 통기성 부여를 위한 다수의 통기구멍을 형성하여 공기 주입구를 통한 공기 주입시 피부 접촉면에 공기 분사가 이루어질 수 있도록 구성하는 것도 바람직할 것이다.

[0026] 이러한 구성의 본 발명에 따른 석션기 일체형 에어매트리스 장치의 전체적인 동작을 설명한다.

[0027] 도 5a와 도 5b는 석션기 동작 전과 후의 피부 상태를 설명하기 위하여 예시한 참고도이고, 도 6은 본 발명의 사용상태를 예시한 참고도이고, 도 7은 본 발명의 효과를 설명하기 위하여 예시한 참고도이고, 도 8은 본 발명에서의 순차적 제어 동작을 설명하기 위하여 예시한 혈류 개선 모식도이다.

[0028] 먼저 에어/석션 제어부(200)를 통해 에어매트(100) 내 각각의 공기 주머니(110)로의 공기 주입과 석션기(120)의 공기 배출 동작, 또는 공기 주머니(110)로의 공기 주입과 석션기(120)의 공기 배출 동작 및 열적 자극을 위한 건조/온열 조건, 자극을 원하는 부위, 부위별 구동 순서 및 자극 강도를 각각 설정하게 되면, 에어/석션 제어부(200)는, 자극을 원하는 부위, 부위별 구동 순서 및 자극 강도에 따라 주입/흡입 일체형 펌프를 제어하여 다수 개의 공기 주머니(110)에 공기를 주입하는 동작 및 각 석션기(120)로부터 공기를 배출시키는 동작을 순차적으로 실시하도록 함으로써, 다수 개의 공기 주머니(110)와 다수 개의 석션기(120)를 이용한 자극 부위의 선택 및 자극 강도의 조절이 가능하게 된다.

[0029] 도 7 및 도 8을 예로 들면, 만약 공기 주머니로의 공기 주입 순서가 1번 공기주머니부터 시작하여 하나씩 아래로 이동하도록 설정되어 있고 석션 자극의 강도 및 순서가 각각 10~50㎜Hg까지 단계적 인가, 그리고 1번 석션기부터 시작하여 하나씩 아래로 이동하도록 설정되어 있는 경우, 에어/석션 제어부(200)는 1번 공기 주머니부터

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10번 공기 주머니까지 차례대로 공기를 주입하면서 아울러 석션 자극 순서 또한 1번 석션기로부터 7번 석션기까지 차례로 공기를 배출시켜 석션기 내부의 음압 자극의 강도가 10~50㎜Hg 범위 내에서 가변되도록 조절할 수 있게 된다. 따라서 도 8에 도시된 바와 같이 순차적인 음압 자극(음압 자극이 이루어지는 석션기는 도면에서 짙은 음영으로 표시됨)을 통한 신체 전체의 순차적 혈류 이동으로 전체의 혈액 공급이 원할하게 이루어질 수 있게 되며, 이러한 음압 자극에 의한 마사지 효과로 기혈의 흐름을 도움으로써 국소적 욕창 발생을 방지할 수 있게 한다. 또한 석션기 내부에 원적외선 발광다이오드가 설치된 경우에는 각각의 석션기 내부에 설치된 원적외선 다이오드를 함께 구동하여 건조/온열을 위한 열적 자극을 함께 실시할 수 있게 되거나, 또는 이와는 반대의 순서대로 공기 주입 및 공기 흡입이 이루어질 수 있게 된다.

[0030] 이상의 본 발명에 의한 에어매트리스 장치는 에어매트에 석션기가 일체형으로 내장되고 아울러 전자동 주입/흡입 일체형 펌프를 사용하여 부위별 제어 및 단계별 자극 조절이 가능하게 되므로 순차적 혈류 이동에 의한 전체의 혈액 공급을 원할히할 뿐만 아니라 편리한 조작성을 갖게 되며, 따라서 별도의 간호없이도 자동적으로 음압 자극 및 열적 자극을 간단히 공급할 수 있게 되어 매우 편리하게 사용할 수 있는 이점이 있다.

[0031] 또한 본 발명은 음압 자극을 이용하여 혈류 근육 상태를 개선하여 피부 상태를 호전시킬 수 있게 되며, 원적외선 발광다이오드에 의한 열적 자극을 통해 근육 이완을 도울 수 있고, 석션키의 컵을 실리콘으로 만들어 사용함으로써 일정 음압 이상 증가 시 실리콘 컵의 자체 변형이 발생될 수 있게 하여 피부에 가해지는 압력을 줄일 수 있게 되므로 접촉면 흡입강도 증가에 위한 통증호소 및 부작용을 방지할 수 있다.

[0032] 이상과 같이 본 발명은 비록 한정된 실시예와 도면에 의해 설명되었으나, 본 발명은 상기의 실시예에 한정되는 것은 아니며, 이는 본 발명이 속하는 분야에서 통상의 지식을 가진 자라면 이러한 기재로부터 다양한 수정 및 변형이 가능하다. 따라서, 본 발명 사상은 아래에 기재된 특허청구범위에 의해서만 파악되어야 하고, 이의 균등 또는 등가적 변형 모두는 본 발명 사상의 범주에 속한다고 할 것이다.

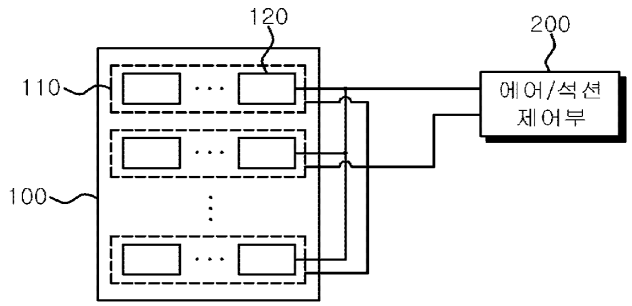
부호의 설명

[0033]

100 : 에어매트	110 : 공기 주머니
111 : 공기 주입구	112 : 공기 흡입구
120 : 석션기	121 : 석션 컵
122 : 공기 배출구	123 : 온열/건조부재
124 : 피부함몰 방지부재	125 : 지지부재
200 : 에어/석션 제어부	

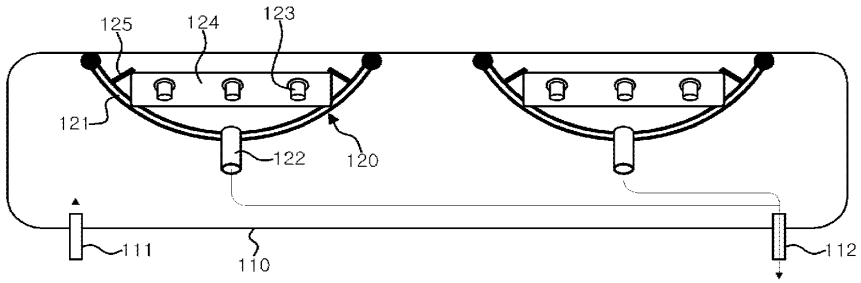
도면

도면1

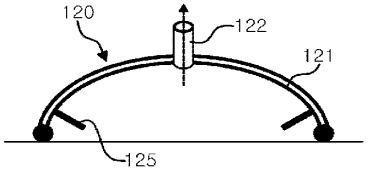


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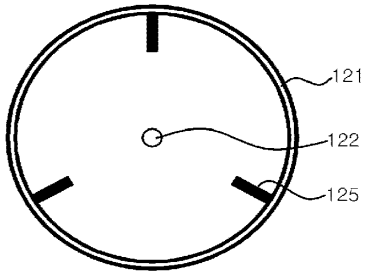
도면2



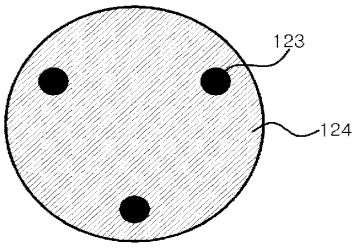
도면3a



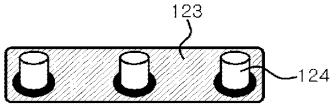
도면3b



도면3c

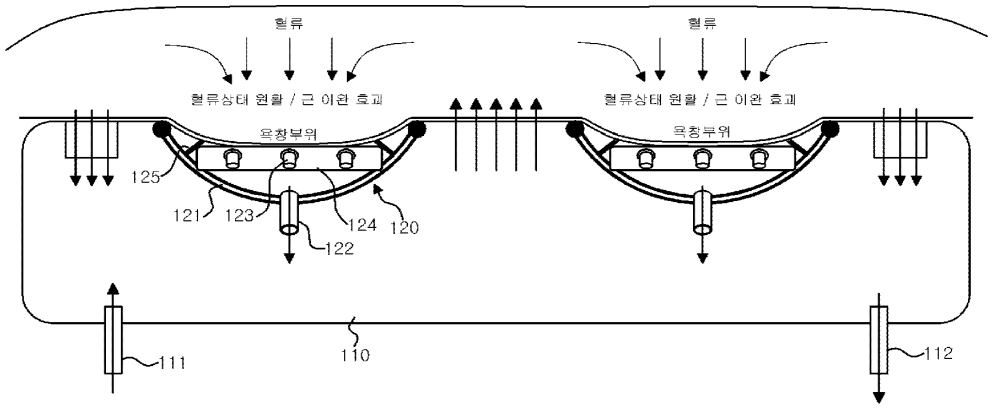


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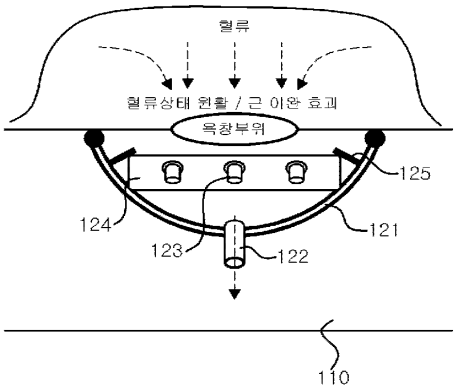


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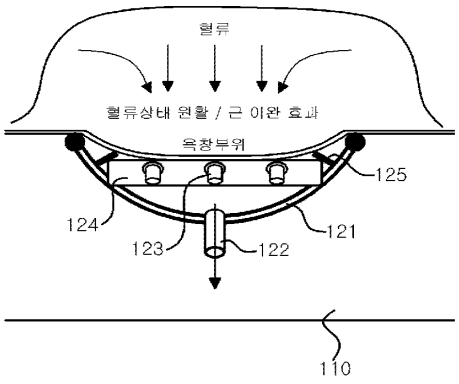
도면4



도면5a

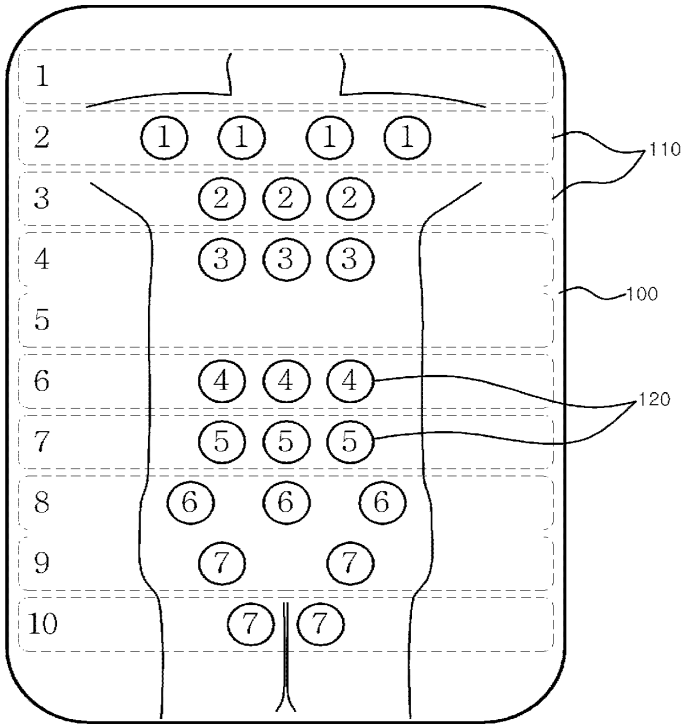


도면5b

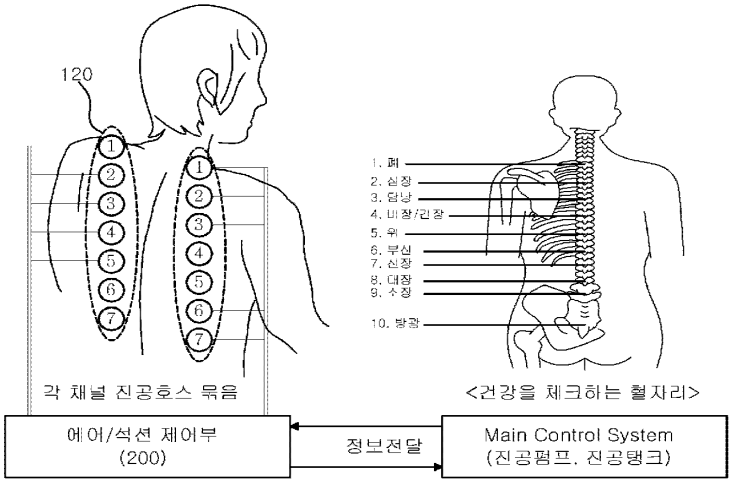


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도면6

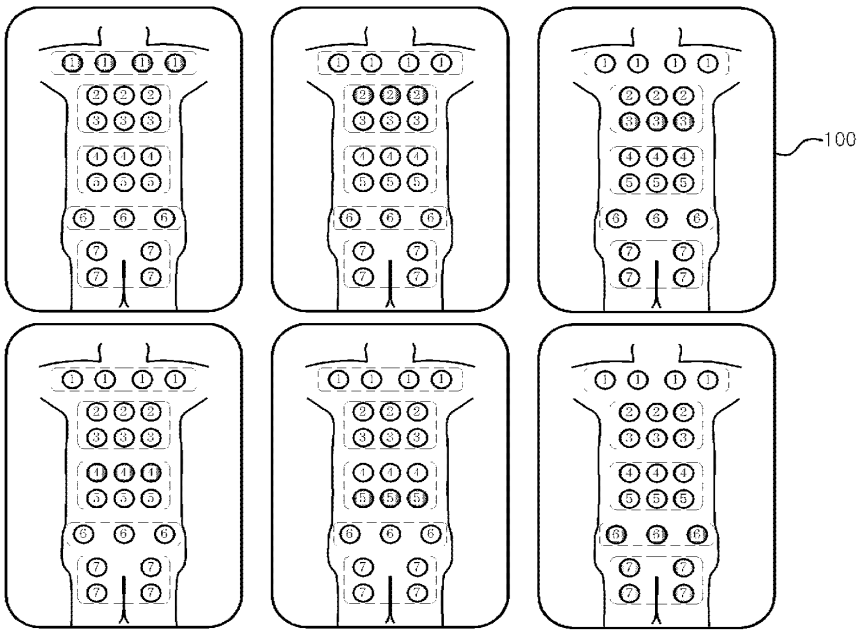


도면7



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도면8



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference **PHC001-0001**	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. **PCT/US2018/056814**	International filing date *(day/month/year)* **22 October 2018 (22.10.2018)**	Priority date *(day/month/year)* **23 October 2017 (23.10.2017)**
International Patent Classification (IPC) or both national classification and IPC IPC: A61B 5/00, 5/04; A61N 1/04, 1/36; G06F 3/01 CPC: See Supplemental Sheet		
Applicant **PATENT HOLDING COMPANY 001, LLC**		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 46 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions).
      ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4*bis*, 70.2(e), 70.16 and 91.2).
      ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)).
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____ containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3*ter* of Annex C of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☑ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☑ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22 August 2019 (22.08.2019)	**23 March 2020 (23.03.2020)**
Name and mailing address of the IPEA/US **COMMISSIONER FOR PATENTS MAIL STOP PCT, ATTN: IPEA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, UNITED STATES OF AMERICA** Facsimile No. **(571)273-8300**	Authorized officer **DAVID MAKIYA** Telephone No. **571-272-2273**

Form PCT/IPEA/409 (cover sheet) (January 2015)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US2018/056814

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:
   - [x] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of:
     - [ ] international search (Rules 12.3(a) and 23.1(b))
     - [ ] publication of the international application (Rule 12.4(a))
     - [ ] international preliminary examination (Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
   - [ ] the international application as originally filed/furnished, or
   - [x] the description:
     pages **1-94** as originally filed/furnished.
     pages* _____ received by this Authority on _____
     pages* _____ received by this Authority on _____
   - [x] the claims:
     Nos. _____ as originally filed/furnished.
     Nos.* _____ as amended (together with any statement) under Article 19
     Nos.* **1-70** received by this Authority on **22 August 2019 (22.08.2019)**
   - [x] the drawings:
     pages **1/14-14/14** as originally filed/furnished.
     pages* _____ received by this Authority on _____
     pages* _____ received by this Authority on _____
   - [ ] a sequence listing - see Supplemental Box Relating to Sequence Listing.
3. [x] The amendments have resulted in the cancellation of:
   - [x] the description, pages **NONE**
   - [x] the claims, Nos. **NONE**
   - [x] the drawings, sheets/figs **NONE**
   - [x] the sequence listing *(specify)*: **NONE**
4. [ ] This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-*bis*)):
   - [ ] the description, pages _____
   - [ ] the claims, Nos. _____
   - [ ] the drawings, sheets/figs _____ _____
   - [ ] the sequence listing *(specify)*: _____
5. [ ] This report has been established:
   - [ ] taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-*bis*) and 70.2(e)).
   - [ ] without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4*bis* and 70.2(e)).
6. With regard to top-up searches (Rules 66.1*ter* and 70.2(f)):
   - [x] A top-up search was carried out by this Authority on **23 March 2020 (23.03.2020)**
     - [ ] Additional relevant documents have been discovered during the top-up search.
   - [ ] No top-up search was carried out by this Authority because it would serve no useful purpose.
7. [ ] Supplementary international search report(s) from Authority(ies) _____ has/ have been received and taken into account in establishing this report (Rule 45*bis*.8(b) and (c)).

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

Petitioner Therabody Ex-1004, 0699

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US2018/056814

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-70	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-70	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-70	YES
	Claims	NONE	NO

2. Citations and explanations (Rule 70.7)

---------- **EXPLANATION** ----------

Claims **1-70 meet** the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest **the claimed plurality of energy generators to output an energy signal in the signal direction with one or more energy types of the plurality of different energy types, as claimed**.

Petitioner Therabody Ex-1004, 0700

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/US2018/056814

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of CPC:
A61B 5/002, 5/0015, 5/04001; A61N 1/0456, 1/0492, 1/36014, 1/36017; G06F 3/011, 3/015, 3/016

Petitioner Therabody Ex-1004, 0701

PATENT
Customer No.: 158475
Attorney Docket No.: PHC001-0001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Art Unit: 2884
MATTHEW R. LEAPER	Examiner: Not Yet Assigned
Application No.: PCT/US2018/056814	Confirmation No.: 5789
Filed: October 22, 2018	**VIA EFS WEB**
For: COMMUNICATION DEVICES, METHODS, AND SYSTEMS	

Mail Stop PCT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

ARTICLE 34 AMENDMENT

In this reply (the "Reply") to the Written Opinion dated 22 February 2019 (the "Written Opinion"), the response deadline for which is August 23, 2019, Applicant requests amendment of this Application by replacing the originally filed claims with the replacement claims enclosed with this Reply.

REMARKS

Claims 1-30 and 32-70 were pending prior to this amendment, in which:

- Claim 1 is the only independent claim and has been amended as follows:

> 1. A communication device comprising:
>
> a body comprising a distal surface compatible with skin;
>
> a tissue interface on the distal surface, the tissue interface comprising a plurality of energy generators, each energy generator being operable to output a plurality of different energy types~~energies~~ in a signal direction toward the skin;
>
> an attachment element configured to maintain the tissue interface against the skin; and
>
> a processing unit configured to communicate with nerves associated with the skin during by receiving input data from a data source and causing the plurality of energy generators to output an energy signal in the signal direction with one or more energy types~~energies~~ of the plurality of different energy types~~energies~~.

Support for these amendments to claim 1 may be found in: paragraphs [0108]-[0120] and FIGs. 3A-B and 4A-D of the published application, which describe exemplary aspects of the plurality of energy generators; and paragraphs [0121]-[130] and FIGs 5, which describe exemplary aspects of the processing unit.

- Claims 4-7, 14, 21, 24-29, 37-38, 46, and 55 depend from independent claim 1 and have been amended in keeping with the amendments to claim 1 and correct for grammar as appropriate. Support for these amendments may be found in the paragraphs and figures referenced above for claim 1.

- New claim 31 is added. Support for new claim 31 may be found in original claims 62 and 64, paragraphs [0019], [0021], and [0122]-[0125], and FIGs. 2A-C and 5.

- No claims have been cancelled.

- Claims 1-70 are pending after this amendment.

The attached replacement pages include a clean copy of the amendments to claims 1, 4-7, 14, 21, 24-29, 37-38, 46, and 55 outlined above. No new matter has been added by these amendments. For convenience, a marked-up, annotated copy of the replacement pages also is attached to highlight the amendments.

Novelty and Inventive Step

Applicant thanks the Examiner for indicating that claims 39-46 meet the criteria set forth in PCT Article 33(2)-(3) because the prior art fails to disclose or suggest the particular combination of elements recited in those claims. For at least the reasons stated below, Application respectfully submits that all of pending claims 1-70 now meet the criteria.

The Written Opinion alleges that D1 (U.S. Patent Publication No. 2016/0129248 A1 to Creasy et al.) deprives previously pending claims 1, 2, 12, 13, 22, 23, 30, 32-35, 37, 38, 47, 50-52, and 63 of novelty.

With respect to inventive step, the Opinion further alleges that:

- D1 deprives previously pending claim 8 of inventive step;
- D1 in view of D2 (U.S. Patent Publication No. 2010/0145425 A1 to Jung et. al.) deprives previously pending claim 3 of inventive step;
- D1 in view of D3 (U.S. Patent No. 9,582,035 B2 to Connor) deprives previously pending claims 9-11, 14-21, 24-29, 53-62, and 64-70 of inventive step;
- D1 in view of D4 (U.S. Patent No. 5,627,548 to Woo et al.) deprives claim 36 of inventive step;
- D1 in view of D5 (U.S. Patent Publication No. 2013/0202674 A1 to Ericson) deprives claims 48 and 49 of inventive step; and
- D1 in view of D2 and further in view of D6 (U.S. Patent Publication No. 2014/0172062 A1 to Yoon) deprives claims 4-7 of inventive step.

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Independent Claim 1 (as amended)

As understood by Applicant, D1 pertains to a "topical nerve stimulator patch" comprising an "electrical signal generator" configured to output a single type of energy – i.e., electricity – to the skin. Varied forms of the single type of energy may be used. For example, paragraph [0052] of D1 describes a topical nerve simulator that "has one or more electronic circuits or chips that perform the functions of: communications with the controller, nerve stimulation via one or more electrodes 408 that produce a wide range of electric field(s) according to a treatment regime, and one or more antennae 410 that may also serve as electrodes and communication pathways." As a further example, paragraph [0077] of D1 states that: "An example 10×10 matrix of electrical contacts 1860 is shown. By varying the pattern of electrical contacts 1860 employed to cause an electric field 1820 to form and by time varying the applied electrical power to this pattern of contacts 1860, it is possible to steer the field 1820 across different parts of the body, which may include muscle 1870, bone, fat, and other tissue, in three dimensions." In both examples, and throughout D1, only an electrical energy type is described without reference to another, non-electrical energy type.

In contrast to D1, amended independent claim 1 recites "each energy generator being operable to output a plurality of different energy types in a signal direction toward the skin," and a processing unit "...causing the plurality of energy generators to output an energy signal in the signal direction with one or more energy types of the plurality of different energy types." As described in paragraphs [0135]-[140] of the Application, this configuration allows the energy signal to be communicated to the skin with *any* of the plurality of different energy types, individually or together. Applicant respectfully submits that D1 fails to disclose or suggest these limitations because it only discloses a single energy type, i.e., electricity, and fails to disclose or suggest anything relevant to the plurality of different energy types recited in amended claim 1.

Applicant further submits that D2, D3, D4, D5, and D6 fail to cure the deficiencies of D1 with respect to amended independent claim 1. For example, as understood by Applicant:

- D2 (Jung) pertains to an electrode for stimulating cranial nerves comprising a glass fiber having first and second holes, and a metal wire disposed in the first hole. Paragraph [0005] of D2 states that "stimulating cranial nerves or nerve cells

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with electricity is very useful for treating strokes, preventing attacks, alleviating pain, performing remote control of an animal, etc."; and the remainder of D2 describes the metal wire as being configured to output the electricity. But D2 does not disclose the plurality of different energy types, and thus fails to disclose or suggest the limitations amended claim 1.

- D3 (Connor) pertains to wearable communication devices with display areas. Different means for outputting a single type of energy are described, including skin-contacting members that "move in a repetitive pattern parallel to the surface of the person's skin," skin-contacting members that "move in a repetitive pattern which is substantially perpendicular to the surface of the person's skin," and devices configured to "deliver a low-level of electromagnetic energy to a person's skin." (col.188, l.65 – col. 190, l.20). D3 does not disclose that each energy generator is operable to output a plurality of different energy types, and thus fails to disclose or suggest the limitations of amended claim 1.

- D4 (Woo) pertains to a "navigation wristwear device" comprising an LCD display, a battery, and solar cells on each side of the LCD to help charge the battery. D4 does not disclose a plurality of different energy types and thus fails to disclose or suggest the limitations of amended claim 1.

- D5 (Ericson) pertains to different types of tissue patches, does not disclose a plurality of different energy types, and thus fails to disclose or suggest the limitations of amended claim 1.

- D6 (Yoon) pertains to a medical device with a covering material and an electrical stimulator configured to improve the treatment effect on a damaged part of a living body by using electrical stimulation in combination with the treatment effect of the covering material. D6 does not disclose a plurality of different energy types and thus also fails to disclose or suggest the limitations of amended claim 1.

For at least these reasons, Applicant respectfully submits that amended independent claim 1 meets the criteria set forth in PCT Article 33(2)-(3) because it possesses novelty and inventive step over D1 in view of D2, D3, D4, D5, and/or D6.

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Dependent Claims 2-70 (as amended)

Each of amended dependent claims 2-70, including new dependent claim 31, depends from amended independent claim 1. Dependent claims 4-7, 14, 21, 24-29, 37-38, 46, and 55 have been amended in keeping with amended independent claim 1, and for clarity and grammar where appropriate. Accordingly, at least because of their dependency from claim 1, Applicant respectfully submits that claims 2-70 also meet the criteria set forth in PCT Article 33(2)-(3) because they also possess novelty and inventive step over D1 in view of D2, D3, D4, D5, and/or D6.

Industrial Applicability

The Box V, Section 1 Statement of the Written Opinion indicates that pending claims 1-30 and 32-70 do not have industrial applicability. Applicant respectfully submits that these claims do have industrial applicability, as provided in supplemental box (continuation of Box V) of the Written Opinion, which states that: "Claims 1-30 and 32-70 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry." Applicant further states that new claim 31 also has industrial applicability for the same reason.

CONCLUSION

The Written Opinion contains characterization of the claims and the cited art with which the Applicant does not necessarily agree. Unless expressly noted otherwise, Applicant declines to subscribe to any statement or characterization in the Written Opinion.

In discussing the specification and claims in this Reply, it is to be understood that the Applicant is in no way intending to limit the scope of the claims to any exemplary embodiments described in the specification or abstract and/or shown in the drawings. Rather, Applicant is entitled to have the claims interpreted broadly to the maximum extent permitted by any statute, regulation, applicable case law, and the like.

In view of the foregoing remarks, Applicant submits that all of pending claims 1-70 meet the criteria set forth in Article 33(2)-(3) because the prior art fails to disclose or suggest the particular combination of elements recited in those claims. Pursuant to Rule 66.4(b), Applicant respectfully requests one or more additional opportunities to submit

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amendments and/or arguments, should the amendments and/or arguments present in this Reply be deemed insufficient to overcome all objections of the International Preliminary Examining Authority.

If the Examiner believes that a telephone conversation about this Application might be helpful, then the Examiner is welcome and invited to call Applicant's undersigned representative Matthew Robert Leaper at the number set forth below.

Respectfully submitted,

Dated: 22AUG2019

By: /MATTHEW R. LEAPER/
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MARKED-UP COPY OF THE CLAIMS PROVIDED FOR CONVENIENCE

1. (Currently Amended) A communication device comprising:

a body comprising a distal surface compatible with skin;

a tissue interface on the distal surface, the tissue interface comprising a plurality of energy generators, each energy generator being operable to output a plurality of different energy types~~energies~~ in a signal direction toward the skin;

an attachment element configured to maintain the tissue interface against the skin; and

a processing unit configured to communicate with nerves associated with the skin during by receiving input data from a data source and causing the plurality of energy generators to output an energy signal in the signal direction with one or more energy types~~energies~~ of the plurality of different energy types~~energies~~.

2. (Original) The device of claim 1, wherein the body is flexible.

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3. (Original) The device of claim 1, wherein the body comprises a plurality of communication bays, and each energy generator is located in and configured to output the energy signal out of one of the communication bays.

4. (Currently Amended) The device of claim 3, wherein the body comprising an insulating material configured to promote flows of the one or more energy typesenergies out of the plurality of communication bays in directions in the signal direction, and limit flows of the one or more energy typesenergies between the plurality of communication bays.

5. (Currently Amended) The device of claim 4, wherein the attachment element comprises a plurality of holes aligned with the plurality of communication bays, and each energy generator is configured to output the plurality of different energy typesenergies through one of the holes.

6. (Currently Amended) The device of claim 5, wherein an interior surface of each communication bay or hole is configured to direct the one or more energy typesenergies in the signal direction.

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7. (Currently Amended) The device of claim 6, wherein the interior surface of each communication bay or hole is configured to focus at least one energy type of the one or more energy types~~energies~~.

8. (Original) The device of claim 1, wherein the attachment element comprises a biocompatible adhesive disposed on the distal surface of the body.

9. (Original) The device of claim 1, wherein the attachment element comprises an elastic portion configured to maintain the tissue interface against the skin.

10. (Original) The device of claim 9, wherein the elastic portion expands to receive a circular portion of the skin and contracts to maintain the tissue interface against the circular portion of the skin.

11. (Original) The device of claim 1, wherein the body is removably attached to the attachment element.

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12. (Original) The device of claim 1, wherein the input data comprises a measurement, and the processing unit is configured to modify the energy signal based on the measurement.

13. (Original) The device of claim 12, wherein the processing unit is configured determine a change of the measurement and modify the energy signal based on the change of the measurement.

14. (Currently Amended) The device of claim 1, wherein:

the plurality of energy generators are spaced apart on the distal surface of the body in a pattern;

each energy generator is operable to output the one or more energy types~~energies~~ in the signal direction toward a different point on the pattern; and

the energy signal comprises a plurality of symbols based on the pattern.

15. (Original) The device of claim 14, wherein each symbol comprises a plurality of dots, and each dot corresponds with one of the different points on the pattern.

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16. (Original) The device of claim 14, wherein the plurality of symbols comprises at least one alphanumeric symbol.

17. (Original) The device of claim 14, wherein the processing unit is operable with the plurality of energy generators to scroll the plurality of symbols across the skin at a scroll rate in a communication direction transverse with the signal direction.

18. (Original) The device of claim 16, wherein the input data comprises vital signs of a subject, and the plurality of symbols comprises symbol associated with each vital sign.

19. (Original) The device of claim 18, wherein the plurality of symbols comprises a symbol associated with a location of the subject.

20. (Original) The device of claim 19, wherein the processing unit is configured to:

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determine a change of the vital signs; and

modify one or both of the plurality of symbols and the scroll rate based on the change of the vital signs.

21. (Currently Amended) The device of claim 20, wherein the processing unit is configured to:

output one or more of the plurality of symbols with a first combination of the one or more energy types~~energies~~ when the change is within a predetermined range; and

output the one or more of the plurality of symbols with a second combination of the one or more energy types~~energies~~ when the change is outside the predetermined range.

22. (Original) The device of claim 1, wherein the data source comprises one or more data sources, and the processing unit is configured to:

receive the input data from the one or more data sources; and

generate a control signal based on the input data; and

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cause the plurality of energy generators to output the energy signal according to the control signal.

23 (Original). The device of claim 22, wherein the processing unit is further configured to:

determine a change in the input data; and

modify the control signal based on the change of the input data.

24. (Currently Amended) The device of claim 23, wherein the control signal comprises a scroll rate for the energy signal and the processing unit is further configured to:

select the scroll rate based on the input data; and

cause the plurality of generators to scroll the one or more energy typesenergies across the skin at the scroll rate.

25. (Currently Amended) The device of claim 22, wherein:

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each energy generator of the plurality of energy generators comprises a plurality of generator elements and a controller operable with the plurality of generator elements to output the plurality of different energy types~~energies~~;

the control signal comprises output commands for each controller operable with the plurality of generator elements of each energy generator; and

each controller is configured to receive the control signal, select one of the output commands, and cause one or more generator elements of the plurality of generator elements to output the one or more energy types~~energies~~ based on the selected one of the output commands.

26. (Currently Amended) The device of claim 1, each energy generator comprises a plurality of generator elements, and each generator element is operable to output one energy type of the plurality of different energy types~~energies~~ in the signal direction.

27. (Currently Amended) The device of claim 26, wherein, for each energy generator, the plurality of generator elements comprises one or more of: an

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impact generator element; a heat generator element; a shock generator element; and a pressure generator element.

28. (Currently Amended) The device of claim 27, wherein each generator element is configured to output the one energy type of the plurality of different energy types~~energies~~ in the signal direction toward a similar point or area on the skin.

29. (Currently Amended) The device of claim 28, wherein, for each energy generator, the plurality of generator elements are arranged coaxially with a communication axis parallel to the signal direction.

30. (Original) The device of claim 1, wherein the data source comprises a local sensor that is attached to the body and configured to output at least a portion of the input data.

31. (New) The device of claim 30, wherein the local sensor comprises at least one of a motion sensor and a position sensor.

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32. (Original) The device of claim 1, wherein the data source comprises at least one remote sensor that is remote from the body and configured to output at least a portion the input data.

33. (Original) The device of claim 32, wherein the processing unit is configured to receive the input data from a server in communication with the at least one remote sensor.

34. (Original) The device of claim 33, wherein the at least one remote sensor comprises a health monitoring device.

35. (Original) The device of claim 1, further comprising a power generator attached to the body.

36. The device of claim 35, wherein the power generator comprises a photovoltaic cell mounted to a proximal surface of the body.

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37. (Currently Amended) The device of claim 1, wherein the one or more energy typesenergies comprise:

a first energy type configured to communicate the energy signal; and

a second energy type configured to modify a penetration depth of the first energy type.

38. (Currently Amended) The device of claim 37, wherein the first energy type is communicable with a first portion of the nerves, and thea second energy type is communicable with a second portion of the nerves.

39. (Original) The device of claim 1, wherein:

the body comprises an impact absorbing material; and

the attachment element comprises a garment configured to maintain a position of the impact absorbing material relative to a user body.

40. (Original) The device of claim 39, wherein the processing unit is configured to determine a direction of movement for the user body and output the energy signal based on the direction of movement.

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41. (Original) The device of claim 40, wherein the processing unit is configured to determine a change in the direction of movement and modify the energy signal based on the change in the direction of movement.

42. (Original) The device of claim 1, wherein the attachment element comprises a shoe, and the distal surface of the body comprises an interior surface of the shoe.

43. (Original) The device of claim 42, wherein the input data comprises GPS signals, and the processing unit is configured to communicate a direction of movement for a user body based on the GPS signals.

44. (Original) The device of claim 1, wherein the attachment element comprises a grip, and the body comprises an exterior surface of the grip.

45. (Original) The device of claim 44, wherein the grip is integral with a weapon comprising a sight, the input data comprises data associated with an

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orientation of the sight, and the energy signal is configured to communicate a status of the weapon based on the orientation of the sight.

46. (Currently Amended) The device of claim 45, wherein the input data comprises data associated with an alignment of the sight with a target, and the processing unit is configured to output the energy signal with a first combination of the one or more energy typesenergies when the target is not aligned with the sight and a second combination of the one or more energy typesenergies when the target is aligned with the sight.

47. (Original) The device of claim 1, wherein the device is implantable.

48. (Original) The device of claim 47, wherein the attachment element comprises a bone plate engageable with a bone to orient the tissue interface toward an underside of the skin.

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49. (Original) The device of claim 48, wherein the attachment element comprises a tissue in-growth structure interactable with living tissue to maintain an orientation of the tissue interface toward an underside of the skin.

50. (Original) The device of claim 1, wherein:

the plurality of energy generators are arranged in bands;

the attachment element is configured to maintain each band against the skin;

the input data comprises input data for each band; and

the processing unit is configured to communicate with nerves associated with the skin by causing the plurality of energy generators in each band to output a different energy signal based on the input data for each band.

51. (Original) The device of claim 50, wherein:

the body extends along a longitudinal axis; and

the bands are spaced apart along the longitudinal axis.

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52. (Original) The device of claim 51, wherein the body is configured to wrap around a limb so that the longitudinal axis of body is aligned with a longitudinal axis of the limb, and the bands wrap around the limb about the longitudinal axis.

53. (Original) The device of claim 52, wherein the processing unit is operable with the plurality of energy generators to scroll each different energy signal in each band in a communication direction transverse with the signal direction.

54. (Original) The device of claim 53, wherein the input data for each band comprises different vital signs, and each different energy signal is based on one of the different vital signs.

55. (Currently Amended) The device of claim 1, wherein the signal direction comprises a first signal direction and the device comprises:

an optical interface on a proximal surface of the body, the optical interface comprising at least one display element operable to output at least

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one color toward eyes in a second signal direction opposite of the first signal direction,

wherein the processing unit is operable with the tissue interface and the optical interface to communicate simultaneously with nerves associated the skin and the eyes by outputting the energy signal with the one or more energy typesenergies of the plurality of energies in the first signal direction and outputting an optical signal with the at least one color in the second signal direction.

56. (Original) The device of claim 55, wherein the body extends along a longitudinal axis, and the first and second signal directions are transverse with the longitudinal axis.

57. (Original) The device of claim 56, wherein the energy signal and the optical signal are scrolled together along or about the longitudinal axis.

58. (Original) The device of claim 55, wherein the processing unit is configured to:

receive the input data from the data source;

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generate a control signal based on the input data;

cause the plurality of energy generators to output the energy signal according to the control signal; and

cause the at least one display element to simultaneously output the optical signal according to the control signal.

59. (Original) The device of claim 58, wherein the energy signal corresponds with the optical signal.

60. (Original) The device of claim 59, wherein the input data comprises vital signs of a subject, the energy signal comprises a plurality of symbols associated with the vital signs, and the optical signal comprises the plurality of symbols.

61. (Original) The device of claim 60, wherein the processing unit is configured to:

determine a change of the vital signs; and

modify the plurality of symbols based on the change of the vital signs.

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62. (Original) The device of claim 61, comprising a motion sensor attached to the body, wherein the processing unit is configured to selectively output the optical signal in response to the motion sensor.

63. (Original) A communication system comprising:

a plurality of communication devices according to claim 1; and

at least one processor that is in communication with the plurality of communication devices and configured to:

generate a corrective motion signal based on position data for the plurality of communication devices; and

cause each communication device to output its energy signal based on the corrective motion signal.

64. (Original) The system of claim 62, further comprising at least one position sensor configured to determine the position data and output the position data to the at least one processor.

65. (Original) The system of claim 64, wherein:

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the position data comprises an actual location of each communication device; and

the at least one processor is configured to generate the corrective motion signal based on the actual location of each communication device and a target location of each communication device.

66. (Original) The system of claim 64, wherein:

the position data comprises an actual spatial configuration of the plurality of communication devices; and

the at least one processor is configured to generate the corrective motion signal based on the actual spatial configuration and a target spatial arrangement for the plurality of communication devices.

67. (Original) The system of claim 66, wherein the at least one processor is configured to:

determine a movement direction for each communication device based on the actual and target spatial arrangements; and

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cause each communication device to scroll its energy signal across the skin in the movement direction.

68. (Original) The system of claim 67, wherein:

each communication device is mounted to a different part of a user body; and

the target spatial arrangement comprises a physical position of the user body defined by relative positions of each different part of the user body.

69. (Original) The system of claim 68, wherein physical position of the user body comprises a pose or a stance.

70. (Original) The system of claim 69, wherein the at least one processor is configured to guide the user body through a series of different positions by determining the movement direction at intervals and modifying the energy signal for each interval.

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CLAIMS

1. A communication device comprising:

a body comprising a distal surface compatible with skin;

a tissue interface on the distal surface, the tissue interface comprising a plurality of energy generators, each energy generator being operable to output a plurality of different energy types in a signal direction toward the skin;

an attachment element configured to maintain the tissue interface against the skin; and

a processing unit configured to communicate with nerves associated with the skin during by receiving input data from a data source and causing the plurality of energy generators to output an energy signal in the signal direction with one or more energy types of the plurality of different energy types.

2. The device of claim 1, wherein the body is flexible.

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3. The device of claim 1, wherein the body comprises a plurality of communication bays, and each energy generator is located in and configured to output the energy signal out of one of the communication bays.

4. The device of claim 3, wherein the body comprising an insulating material configured to promote flows of the one or more energy types out of the plurality of communication bays in directions in the signal direction, and limit flows of the one or more energy types between the plurality of communication bays.

5. The device of claim 4, wherein the attachment element comprises a plurality of holes aligned with the plurality of communication bays, and each energy generator is configured to output the plurality of different energy types through one of the holes.

6. The device of claim 5, wherein an interior surface of each communication bay or hole is configured to direct the one or more energy types in the signal direction.

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7. The device of claim 6, wherein the interior surface of each communication bay or hole is configured to focus at least one energy type of the one or more energy types.

8. The device of claim 1, wherein the attachment element comprises a biocompatible adhesive disposed on the distal surface of the body.

9. The device of claim 1, wherein the attachment element comprises an elastic portion configured to maintain the tissue interface against the skin.

10. The device of claim 9, wherein the elastic portion expands to receive a circular portion of the skin and contracts to maintain the tissue interface against the circular portion of the skin.

11. The device of claim 1, wherein the body is removably attached to the attachment element.

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12. The device of claim 1, wherein the input data comprises a measurement, and the processing unit is configured to modify the energy signal based on the measurement.

13. The device of claim 12, wherein the processing unit is configured determine a change of the measurement and modify the energy signal based on the change of the measurement.

14. The device of claim 1, wherein:

the plurality of energy generators are spaced apart on the distal surface of the body in a pattern;

each energy generator is operable to output the one or more energy types in the signal direction toward a different point on the pattern; and

the energy signal comprises a plurality of symbols based on the pattern.

15. The device of claim 14, wherein each symbol comprises a plurality of dots, and each dot corresponds with one of the different points on the pattern.

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16. The device of claim 14, wherein the plurality of symbols comprises at least one alphanumeric symbol.

17. The device of claim 14, wherein the processing unit is operable with the plurality of energy generators to scroll the plurality of symbols across the skin at a scroll rate in a communication direction transverse with the signal direction.

18. The device of claim 16, wherein the input data comprises vital signs of a subject, and the plurality of symbols comprises symbol associated with each vital sign.

19. The device of claim 18, wherein the plurality of symbols comprises a symbol associated with a location of the subject.

20. The device of claim 19, wherein the processing unit is configured to:

determine a change of the vital signs; and

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modify one or both of the plurality of symbols and the scroll rate based on the change of the vital signs.

21. The device of claim 20, wherein the processing unit is configured to:

output one or more of the plurality of symbols with a first combination of the one or more energy types when the change is within a predetermined range; and

output the one or more of the plurality of symbols with a second combination of the one or more energy types when the change is outside the predetermined range.

22. The device of claim 1, wherein the data source comprises one or more data sources, and the processing unit is configured to:

receive the input data from the one or more data sources; and

generate a control signal based on the input data; and

cause the plurality of energy generators to output the energy signal according to the control signal.

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23 (Original). The device of claim 22, wherein the processing unit is further configured to:

determine a change in the input data; and

modify the control signal based on the change of the input data.

24. The device of claim 23, wherein the control signal comprises a scroll rate for the energy signal and the processing unit is further configured to:

select the scroll rate based on the input data; and

cause the plurality of generators to scroll the one or more energy types across the skin at the scroll rate.

25. The device of claim 22, wherein:

each energy generator of the plurality of energy generators comprises a plurality of generator elements and a controller operable with the plurality of generator elements to output the plurality of different energy types;

the control signal comprises output commands for each controller operable with the plurality of generator elements of each energy generator; and

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each controller is configured to receive the control signal, select one of the output commands, and cause one or more generator elements of the plurality of generator elements to output the one or more energy types based on the selected one of the output commands.

26. The device of claim 1, each energy generator comprises a plurality of generator elements, and each generator element is operable to output one energy type of the plurality of different energy types in the signal direction.

27. The device of claim 26, wherein, for each energy generator, the plurality of generator elements comprises one or more of: an impact generator element; a heat generator element; a shock generator element; and a pressure generator element.

28. The device of claim 27, wherein each generator element is configured to output the one energy type of the plurality of different energy types in the signal direction toward a similar point or area on the skin.

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29. The device of claim 28, wherein, for each energy generator, the plurality of generator elements are arranged coaxially with a communication axis parallel to the signal direction.

30. The device of claim 1, wherein the data source comprises a local sensor that is attached to the body and configured to output at least a portion of the input data.

31. The device of claim 30, wherein the local sensor comprises at least one of a motion sensor and a position sensor.

32. The device of claim 1, wherein the data source comprises at least one remote sensor that is remote from the body and configured to output at least a portion the input data.

33. The device of claim 32, wherein the processing unit is configured to receive the input data from a server in communication with the at least one remote sensor.

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34. The device of claim 33, wherein the at least one remote sensor comprises a health monitoring device.

35. The device of claim 1, further comprising a power generator attached to the body.

36. The device of claim 35, wherein the power generator comprises a photovoltaic cell mounted to a proximal surface of the body.

37. The device of claim 1, wherein the one or more energy types comprise:

a first energy type configured to communicate the energy signal; and

a second energy type configured to modify a penetration depth of the first energy type.

38. The device of claim 37, wherein the first energy type is communicable with a first portion of the nerves and the second energy type is communicable with a second portion of the nerves.

39. The device of claim 1, wherein:

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the body comprises an impact absorbing material; and

the attachment element comprises a garment configured to maintain a position of the impact absorbing material relative to a user body.

40. The device of claim 39, wherein the processing unit is configured to determine a direction of movement for the user body and output the energy signal based on the direction of movement.

41. The device of claim 40, wherein the processing unit is configured to determine a change in the direction of movement and modify the energy signal based on the change in the direction of movement.

42. The device of claim 1, wherein the attachment element comprises a shoe, and the distal surface of the body comprises an interior surface of the shoe.

43. The device of claim 42, wherein the input data comprises GPS signals, and the processing unit is configured to communicate a direction of movement for a user body based on the GPS signals.

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44. The device of claim 1, wherein the attachment element comprises a grip, and the body comprises an exterior surface of the grip.

45. The device of claim 44, wherein the grip is integral with a weapon comprising a sight, the input data comprises data associated with an orientation of the sight, and the energy signal is configured to communicate a status of the weapon based on the orientation of the sight.

46. The device of claim 45, wherein the input data comprises data associated with an alignment of the sight with a target, and the processing unit is configured to output the energy signal with a first combination of the one or more energy types when the target is not aligned with the sight and a second combination of the one or more energy types when the target is aligned with the sight.

47. The device of claim 1, wherein the device is implantable.

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48. The device of claim 47, wherein the attachment element comprises a bone plate engageable with a bone to orient the tissue interface toward an underside of the skin.

49. The device of claim 48, wherein the attachment element comprises a tissue in-growth structure interactable with living tissue to maintain an orientation of the tissue interface toward an underside of the skin.

50. The device of claim 1, wherein:

the plurality of energy generators are arranged in bands;

the attachment element is configured to maintain each band against the skin;

the input data comprises input data for each band; and

the processing unit is configured to communicate with nerves associated with the skin by causing the plurality of energy generators in each band to output a different energy signal based on the input data for each band.

51. The device of claim 50, wherein:

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the body extends along a longitudinal axis; and

the bands are spaced apart along the longitudinal axis.

52. The device of claim 51, wherein the body is configured to wrap around a limb so that the longitudinal axis of body is aligned with a longitudinal axis of the limb, and the bands wrap around the limb about the longitudinal axis.

53. The device of claim 52, wherein the processing unit is operable with the plurality of energy generators to scroll each different energy signal in each band in a communication direction transverse with the signal direction.

54. The device of claim 53, wherein the input data for each band comprises different vital signs, and each different energy signal is based on one of the different vital signs.

55. The device of claim 1, wherein the signal direction comprises a first signal direction and the device comprises:

an optical interface on a proximal surface of the body, the optical interface comprising at least one display element operable to output at least

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one color toward eyes in a second signal direction opposite of the first signal direction,

wherein the processing unit is operable with the tissue interface and the optical interface to communicate simultaneously with nerves associated the skin and the eyes by outputting the energy signal with the one or more energy types in the first signal direction and outputting an optical signal with the at least one color in the second signal direction.

56. The device of claim 55, wherein the body extends along a longitudinal axis, and the first and second signal directions are transverse with the longitudinal axis.

57. The device of claim 56, wherein the energy signal and the optical signal are scrolled together along or about the longitudinal axis.

58. The device of claim 55, wherein the processing unit is configured to:

receive the input data from the data source;

generate a control signal based on the input data;

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cause the plurality of energy generators to output the energy signal according to the control signal; and

cause the at least one display element to simultaneously output the optical signal according to the control signal.

59. The device of claim 58, wherein the energy signal corresponds with the optical signal.

60. The device of claim 59, wherein the input data comprises vital signs of a subject, the energy signal comprises a plurality of symbols associated with the vital signs, and the optical signal comprises the plurality of symbols.

61. The device of claim 60, wherein the processing unit is configured to:

determine a change of the vital signs; and

modify the plurality of symbols based on the change of the vital signs.

62. The device of claim 61, comprising a motion sensor attached to the body, wherein the processing unit is configured to selectively output the optical signal in response to the motion sensor.

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63. A communication system comprising:

a plurality of communication devices according to claim 1; and

at least one processor that is in communication with the plurality of communication devices and configured to:

generate a corrective motion signal based on position data for the plurality of communication devices; and

cause each communication device to output its energy signal based on the corrective motion signal.

64. The system of claim 62, further comprising at least one position sensor configured to determine the position data and output the position data to the at least one processor.

65. The system of claim 64, wherein:

the position data comprises an actual location of each communication device; and

the at least one processor is configured to generate the corrective motion signal based on the actual location of each communication device and a target location of each communication device.

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66. The system of claim 64, wherein:

the position data comprises an actual spatial configuration of the plurality of communication devices; and

the at least one processor is configured to generate the corrective motion signal based on the actual spatial configuration and a target spatial arrangement for the plurality of communication devices.

67. The system of claim 66, wherein the at least one processor is configured to:

determine a movement direction for each communication device based on the actual and target spatial arrangements; and

cause each communication device to scroll its energy signal across the skin in the movement direction.

68. The system of claim 67, wherein:

each communication device is mounted to a different part of a user body; and

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the target spatial arrangement comprises a physical position of the user body defined by relative positions of each different part of the user body.

69. The system of claim 68, wherein physical position of the user body comprises a pose or a stance.

70. The system of claim 69, wherein the at least one processor is configured to guide the user body through a series of different positions by determining the movement direction at intervals and modifying the energy signal for each interval.

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Application No.: Not Yet Assigned	)	Examiner: Not Yet Assigned
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Filed: December 1, 2023	)	Confirmation No.: Not Yet Assigned
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For: COMMUNICATION DEVICES, METHODS, AND SYSTEMS	)	**VIA EFS WEB**

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Commissioner:

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98, Applicant brings to the attention of the U.S. Patent and Trademark Office (the "Office") the documents listed on the attached Information Disclosure Statement (or “IDS”) Form PTO/SB/08a. Applicant requests consideration of the IDS under § 1.97(b)(1) because it is submitted within three months of the filing date of a national application.

Copies of the listed U.S. patents and patent applications are not enclosed. Copies of the listed foreign patents and non-patent literature are enclosed.

Applicant respectfully requests that the Office consider the documents listed on the attached IDS Form PTO/SB/08a and indicate that they were considered by making appropriate notations on the attached form.

This submission does not represent that a search has been made or that no better art exists and does not constitute an admission that each or all of the listed documents

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are material or constitute "prior art." If the Office applies any of the documents as prior art against any claim in the application and Applicant determines that the cited documents do not constitute "prior art" under United States law, Applicant reserves the right to present to the U.S. Patent and Trademark Office the relevant facts and law regarding the appropriate status of such documents.

Applicant further reserves the right to take appropriate action to establish the patentability of the disclosed invention over the listed documents, should one or more of the documents be applied against the claims of the present application.

If there is any fee due in connection with the filing of this application that is not otherwise provided, please charge the fee to Deposit Account No. **603446**. In addition, the Commissioner is hereby authorized to, now and throughout prosecution of this application, charge any additional required fees, including any fees due under 37 CFR §1.16 OR §1.17, charge any underpayments, or credit any overpayment to Deposit Account No. **603446**.

Respectfully submitted,

MATTHEW LEAPER
REGISTERED PATENT ATTORNEY

Dated: **01DEC2023**

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Title of Invention

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

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FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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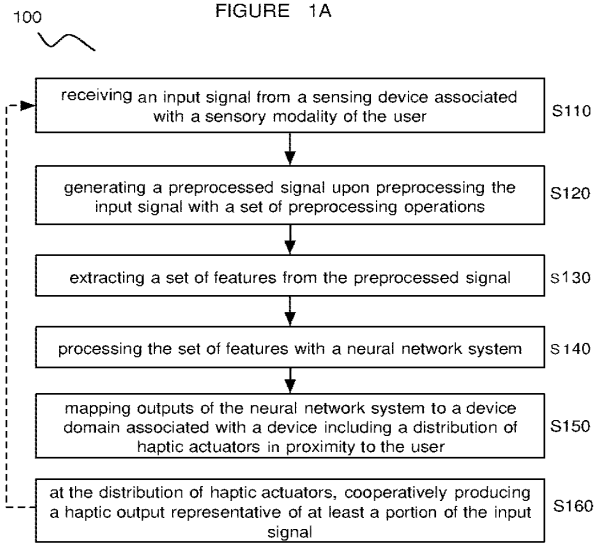
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FIGURE 1A



(57) Abstract: A method for providing information to a user, the method including: receiving an input signal from a sensing device associated with a sensory modality of the user; generating a preprocessed signal upon preprocessing the input signal with a set of preprocessing operations; extracting a set of features from the preprocessed signal; processing the set of features with a neural network system; mapping outputs of the neural network system to a device domain associated with a device including a distribution of haptic actuators in proximity to the user; and at the distribution of haptic actuators, cooperatively producing a haptic output representative of at least a portion of the input signal, thereby providing information to the user.

[Continued on nextpage]

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METHOD AND SYSTEM FOR PROVIDING ADJUNCT SENSORY INFORMATION TO A USER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application serial number 62/384,036, filed on 06-SEP-2016, which is incorporated in its entirety by this reference.

TECHNICAL FIELD

[0002] This invention relates generally to the sensory stimulus technology field, and more specifically to a new and useful system and method for providing information to a user.

BRIEF DESCRIPTION OF THE FIGURES

[0003] FIGURE 1A is a flowchart diagram of an embodiment of the method for providing information to a user;

[0004] FIGURE 1B is a schematic of an embodiment of a method and system for providing information to a user;

[0005] FIGURES 2A and 2B are schematics of embodiments of systems for providing information to a user;

[0006] FIGURES 3A-3C depict example stimuli providing devices associated with a method and system for providing information to a user;

[0007] FIGURES 4A-4B depict variations of methods for providing information to a user;

[0008] FIGURE 5 depicts an example of a neural network architecture associated with a method for providing information to a user;

[0009] FIGURE 6 depicts an example of a haptic output representative of speech content information in an embodiment of a method for providing information to a user;

[0010] FIGURE 7 depicts a portion of a method for providing information to a user; and

[0011] FIGURES 8A-8B depict variations of method flows involving machine-learning facilitate system updates for improving provision of information to a user.

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DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] The following description of the preferred embodiments of the invention is not intended to limit the invention to these preferred embodiments, but rather to enable any person skilled in the art to make and use this invention.

1. *Overview.*

[0013] As shown in FIGURE 1A and 1B, a method 100 for providing information to a user comprises: receiving an input signal from a sensing device associated with a sensory modality of the user Sno; generating a preprocessed signal upon preprocessing the input signal with a set of preprocessing operations S120; extracting a set of features from the preprocessed signal S130; processing the set of features with a neural network system S140; mapping outputs of the neural network system to a device domain associated with a device including a distribution of haptic actuators in proximity to the user S150; and at the distribution of haptic actuators, cooperatively producing a haptic output representative of at least a portion of the input signal, thereby providing information to the user S160. However, the method 100 can additionally or alternatively include any other suitable elements, and can be performed in any suitable manner.

[0014] The method 100 preferably functions to transform input signals associated with at least one sensory modality (e.g., audio signals containing communication-related information, audio signals containing other information, signals containing information associated with vision, signals containing information associated with the sensation of touch, signals containing information associated with tastes, signals containing information associated with smells, etc.) into stimuli provided using a device in proximity to or otherwise worn by a user, wherein the stimuli are associated with signal processing outputs of a different domain, dimensionality, and/or rate than the input signals. The method 100 can be used for users without sensory conditions (e.g., having sensory sensitivity within a typical range) but for whom receiving of information from multiple sensory sources is desired (e.g., to enhance perception and/or enjoyment of the information). The method 100 can additionally or alternatively allow a user with one or more sensory conditions (e.g., reduced sensory sensitivity, enhanced sensory sensitivity, lacking sensitivity in one or more sensory modalities, etc.) to receive information that would otherwise be received through the one or more senses.

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[0015] In variations, the method **100** can thus operate to provide a means for sensory cross-boosting to allow a user to receive and process information, whereby sensory cross-boosting includes a conversion of a ***subset*** of information from one sensory modality (e.g., auditory information for hearing) into another sensory modality (e.g., touch). As such, sensory cross-boosting can be used as a sensory adjunct for a user or for partial sensory substitution (e.g., in relation to a user with partial sensory loss), whereby information typically associated with one sensory modality can be provided to the user by way of multiple sensory modalities of the user. Additionally or alternatively, the method can be used for sensory substitution, whereby information typically associated with one sensory modality (e.g., auditory information) is converted to stimuli associated with another sensory modality (e.g., the sensation of touch), such that the user can perceive the content of the information through a sensory modality not typically used to perceive the content of the information.

[0016] In specific examples, the method **100** can be used to provide real-time (or near real-time) understanding of information acquired using audio sensors (e.g., microphones) to a user by way of a wearable device (e.g., torso-coupled wearable device, limb-borne wearable device, head-coupled wearable device, etc.) operable to provide haptic stimuli to the user. In more detail, processing of the input signals (e.g., audio signals) can be adapted to specific demographics (e.g. age demographics, gender demographics, species demographics, etc.) or sensory conditions, and in a specific application, can include processing input audio signals to allow users with high frequency hearing loss to perceive high frequency auditory information using their sensations of touch.

[0017] The method **100** can thus be implemented using system components described in more detail below, and/or using an embodiment, variation, or example of the system described in U.S. App. No. **14/750,626,** titled "Providing Information to a User Through Somatosensory Feedback" and filed on **25-JUN-2015,** which is herein incorporated in its entirety by this reference. However, the method **100** can additionally or alternatively be implemented using any other suitable system or system components for providing information to users through feedback devices.

2. Benefits.

[0018] The method **100** can confer a number of benefits. First, embodiments of the method **100** can function to transform input signals with characteristic dimensionality and/or

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speed into stimuli (e.g., stimuli provided to a user using one or more devices as sensory inputs to the user) with different dimensionality and/or speed (e.g., transforming low-dimensionality, high-speed input information such as speech information into higher-dimensionality, lower-speed outputs such as tactile outputs; transforming high-dimensionality and/or high-speed input information into lower-dimensionality and/or lower-speed outputs; etc.). In examples, the relationship can be inversely proportional (e.g., as in sound-to-touch for speech processing, which processes a low dimensional and high speed stream into a high dimensional and low speed stream).

[0019] Second, embodiments of the method 100 can implement haptic stimuli-providing devices coupled to one or more users to provide information-rich stimuli to users, based on transformation of input signals associated with one sensory modality to stimuli associated with another sensory modality. In some embodiments, such cross-sensory transformations can aid in perception and/or understanding of the input signals, such as by supplementing and/or replacing the input signals (e.g., associated with a sensory modality for which a user has diminished sensitivity) with related (e.g., complementary, representative, etc.) information delivered via a second sensory modality (e.g., tactile sense). For example, if the input signals include information that cannot easily be provided to the user via the original sensory modality (e.g., due to sensory limitations, output device constraints, etc.), the method 100 can include providing information via the second sensory modality, enabling user perception and/or understanding of the information. In examples, such transformations can be adapted to user-specific needs associated with demographic factors (e.g., age, gender, ethnicity, etc.), health conditions, and/or any other suitable factor(s), whereby components of the information (e.g., high frequency components of speech) associated with the input signals are less readily perceived by users of interest, and stimuli provided by the devices can be modulated to fit the sensory sensitivity (e.g., haptic sensitivity) of the user. Further, in some embodiments, systems associated with such stimuli (e.g., stimulus output devices) can have beneficial form factors and/or modalities of interaction with the user(s). In a specific example, in which the method 100 includes transforming auditory input signals into haptic outputs, the haptic outputs can be provided to the user by a discretely-worn system (e.g., worn under clothing, worn on a body extremity, etc.), whereas some systems configured to provide auditory outputs may include less discrete elements.

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[0020] Third, embodiments of the method 100 can decrease latency in transmitting information to a user by selecting a subset of information contained in input signals for further processing and, ultimately, transformation into stimuli provided to users, thereby improving performance of processing systems associated with the method 100.

[0021] Thus, embodiments of the method 100 can function to provide platforms and devices for supplementing and/or substituting functions of one or more sensory modalities, in a manner that is adapted to specific user needs. However, the method 100 can additionally or alternatively confer any other suitable benefits.

3. System.

[0022] The system preferably receives or generates one or more input signals from appropriate sensors, and provides stimuli (e.g., through sensory output devices in proximity to the user), and can optionally include one or more communication modules, power modules, and/or computational modules (e.g., as shown in FIGURES 2A-2B). The device components associated with the stimuli are preferably disposed in a single device, but can additionally or alternatively be disposed across a plurality of devices, and/or be disposed in any other suitable manner.

[0023] The stimuli can be provided by a plurality of tactile interface devices (e.g., haptic actuators, electrical stimulators, etc.) in a spatial distribution (e.g., multidimensional spatial distribution), each of which can provide a variety of available output stimuli with different stimulus parameters (e.g., as shown in FIGURES 3A-3B). The device(s) can provide haptic stimuli through the tactile interface devices, and in specific examples, can include an array of tactile interface devices operable to provide configurable haptic stimuli to a user. The tactile interface devices can include vibration motors (e.g., eccentric rotating mass (ERM) devices), Linear Resonant Actuators (LRAs), piezoelectric devices, and/or any other suitable devices (and/or combinations thereof, such as hybrid devices incorporating both ERM and LRA elements).

[0024] The device(s) can additionally or alternatively be operable to provide one or more of: auditory stimuli, electrical stimuli (e.g., peripheral stimuli, etc.), olfactory stimuli, taste stimuli, and any other suitable form of stimulus.

[0025] The spatial distribution (e.g., array) of tactile interface devices can have a density from 5 devices per cm^2 to 50 devices per cm^2, or any other suitable density. Furthermore, the

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spatial distribution of tactile interface devices can be configured with any suitable morphological aspects. The tactile interface devices are preferably arranged in one or more arrays (e.g., high-density arrays) but additionally or alternatively arrays of any suitable density. The arrays can include multidimensional arrays (e.g., planar array, 3-dimensional volumetric array, array defined substantially along one or more device surfaces, etc.), single-dimensional arrays (e.g., linear array, curvilinear array, etc.), and/or any other suitable arrays. For example, the device can include a two-dimensional array (e.g., defined substantially on a plane, defined on a curved and/or bent surface, etc.). The arrays can be configured as one or more of: a circular array, an ellipsoidal array, a polygonal array (e.g., a triangular array, rectangular array, a pentagonal array, a hexagonal array, etc.), a circumscribing array, an amorphous array, an array substantially spanning the support structure with which the array is integrated, and any other suitable array type. Additionally or alternatively, the device can include an irregular distribution of tactile interface devices (e.g., arranged substantially on a surface and/or within a volume of the device) and/or any other suitable arrangement of tactile interface devices. Furthermore, the spatial distribution (e.g., array) can be configured across different layers of the overarching device coupled to the user.

[0026] In a first embodiment, as shown in FIGURE 3A, the array of tactile interface devices is integrated with a wrist-region wearable band device, wherein the array is distributed circumferentially about the band surface and coupled to electronics that facilitate provision of haptic stimuli. In this embodiment, the system comprises a housing operable to 1) contain electronics for powering the tactile interface devices and transitioning the tactile interface devices between different modes and 2) support the array of tactile interface devices while positioning the array of tactile interface devices in a manner such that the user can sense stimuli provided by the array. The housing can thus be coupled to or otherwise include a fastener that couples the system to a user. The fastener and housing can be of unitary construction or otherwise physically coextensive, or can be otherwise connected, coupled, or couplable. The fastener is preferably operable to be easily and/or repeatably fastened and unfastened manually by the user, and in specific examples, can include a latch, snap, buckle, clasp, hook-and-loop fastening mechanism, and/or any other suitable fastening mechanism, and/or can be operable to expand and contract (e.g., including an elastic element, such as an expansion band; including a deployment clasp, butterfly clasp, or other clasp that is physically coextensive when unclasped; etc.).

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[0027] In a second embodiment, the tactile interface devices are configured to be carried with a user (e.g., worn by the user, in proximity to the user). In this embodiment, the tactile interface devices are preferably integrated into a wearable garment, wherein the garment can comprise a top (e.g., shirt, vest, etc.), a bottom (e.g., pants, shorts, skirt, etc.), a headpiece (e.g., headband, earmuffs, hat, etc.), a backpack, an undergarment, socks, and any other suitable form of garment. Additionally or alternatively, the tactile interface devices can be configured to be mechanically coupled to the wearable garment (e.g., retained in one or more pockets of the garment, attached by fasteners such as buttons, clips, magnets, and/or hook-and-loop fasteners, attached by adhesive, etc.). Additionally or alternatively, the tactile interface devices can be configured to attach directly to a user (e.g., by suction, adhesive, etc.), preferably to one or more skin surfaces of the user. Additionally or alternatively, the tactile interface devices can be incorporated into one or more wearable devices (e.g., a head-mounted wearable device, etc.) and/or implanted devices. Additionally or alternatively, the tactile interface devices can be incorporated into prosthetic devices (e.g., lower limb prosthetics, upper limb prosthetics, facial prosthetics, etc.). In an example, such as shown in FIGURE 3B, the array of tactile interface devices can be integrated with a vest garment operable to be worn by a user as the user moves about in his/her daily life.

[0028] In a third embodiment, such as shown in FIGURE 3C, the tactile interface devices are configured to be mechanically coupled to the user by a support device that supports the user (e.g., by a support element of the support device). For example, the tactile interface devices can be integrated into the support element and/or arranged between the user and the support element (e.g., resting on top of the support element). The support devices can include seats, couches, beds, platforms (e.g., for sitting and/or standing on), walls, inclined surfaces (e.g., configured to support a leaning user), and/or any other suitable support devices, as described in U.S. App. No. 15/661,934 titled "Method and System for Determining and Providing Sensory Experiences" and filed on 27-JUL-2017, which is herein incorporated in its entirety by this reference.

[0029] Additionally or alternatively, the tactile interface devices can be disposed in a device configured to be held by the user (e.g., hand-held, held between an arm and torso of the user, held between the legs of the user, etc.). Additionally or alternatively, the tactile interface devices can be disposed in a device configured to rest on the user (e.g., retained against the user by gravity), such as a blanket. However, the tactile interface devices can additionally or

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alternatively be coupleable to the user (and/or otherwise configured to interact with the user) in any other suitable manner.

[0030] Each tactile interface device (and/ or other output unit) is preferably controlled by independent signals and configured to actuate independently from the other output units. Alternatively, a group of output units (e.g., a cluster or subset of the output units) can be independently controlled, such that the group of output units can operate independently from the other output units. Each controlled subset (e.g., individual output unit or cluster) can include one or more output units of the same or different types. In variations, in addition to or in alternative to controlling subsets of actuators (e.g., overlapping and/or disjoint subsets) to convey information as a function of features (e.g. in a first group for a first phoneme; in a second group, including only actuators not included in the first group, for a second phoneme; in a third group, including a subset of actuators of the first and second groups, for a third phoneme; etc.), subsets can be used to map a numerical input to a multi-actuator output. In an example, to make the impression of "sweeps"(e.g., turning actuators on and off in quick succession), one could analyze a frame of music and track the strongest/loudest frequency and control the actuators to produce upward/downward "sweeps" as a function of whether the frequency increased or decreased from a previously analyzed frame.

[0031] Each controlled subset is preferably individually identified, such that it has a locally unique identifier (e.g., index value), but can alternatively share an identifier with a second controlled subset of the device, or be otherwise identified. Each controlled subset (or the respective identifier) is preferably associated with a known, stored spatial position on the device (controlled subset position). The controlled subset position can include an arcuate position, radial position, position along an axis (e.g., lateral axis, longitudinal axis, etc.), set of coordinates, grid position, position relative to another device component (e.g., sensor, different output unit, etc.), or be any other suitable position. The controlled subset positions can be stored by the device (e.g., on volatile or non-volatile memory), can be encoded (e.g., implicitly, explicitly) via a re-indexing module (e.g., reindexing array), and/or stored (and/or otherwise made available) by any other suitable system. However, indexing and/or storing can additionally or alternatively be implemented in any other suitable manner.

[0032] Each controlled subset is preferably wired in parallel relative to other controlled subsets of the device, but can alternatively be wired in series, wired in a combination of in parallel and in series, or be wired in any other suitable manner (or not be wired). The controlled

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subsets of the device are preferably controlled by the processor, but can additionally or alternatively be controlled by a remote computing system (e.g., server system), external device (e.g., mobile device, appliance, etc.), and/or any other suitable computing system.

[0033] The input signals associated with the method **100** can be derived from sensors of the system **100** (e.g., wherein sensors are included with the same device(s) that provide the stimuli, wherein sensors are distinct from the devices that provide the stimuli, etc.). The input signals can be derived from local sensors (e.g., sensing an environment of the device and/or user), remote sensors (e.g., sensing a separate environment), virtual inputs (e.g., associated with a virtual environment), and/or any other suitable sensors in any other suitable configuration.

[0034] The input signals preferably include audio and/or music input signals. For example, the input signals can be derived from microphones (e.g., multiple microphones, which can be used to perform beam forming operations to remove environmental artifacts, as described below), and/or other audio sensors, sources of audio data streams (e.g., analog electrical connectors such as audio line in connectors; digital electrical and/or optical connectors configured to receive audio and/or music information such as HDMI, TOSLINK, MIDI, etc.; generic computer data connectors such as USB, Ethernet, etc.; wireless connections such as those enabled by a wireless communication module of the system; etc.), and/or any other suitable audio inputs. The sensors associated with input signals can additionally or alternatively include sensors associated with other sensory experiences (e.g., visual, tactile, olfactory, taste, etc.), other environmental information (e.g., location, location type, velocity, temperature, humidity, etc.), and/or any other suitable information.

[0035] The sensors can additionally or alternatively include one or more: cameras (e.g., CCD, CMOS, multispectral, visual range, hyperspectral, stereoscopic, etc.), spatial sensors (e.g., inertial measurement sensors, accelerometer, gyroscope, altimeter, magnetometer, etc.), location sensors (e.g., GPS, GNSS, triangulation, trilateration, etc.), audio sensors (e.g., transducer, microphone, etc.), barometers, light sensors, temperature sensors, current sensor (e.g., Hall effect sensor), air flow meter, voltmeters, touch sensors (e.g., resistive, capacitive, etc.), proximity sensors, force sensors (e.g., strain gauge meter, load cell), vibration sensors, chemical sensors, sonar sensors, and/or any other suitable sensors. However, the system can additionally or alternatively include any other suitable sensors.

[0036] The communication modules can include wired communication modules (e.g., configured to communicate by wired data connections, such as Ethernet, USB, power line, etc.)

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and/or wireless communication modules (e.g., radios). The wireless communication modules preferably support (e.g., enable communication using) one or more wireless communication protocols (e.g., WiFi, Bluetooth, BLE, NFC, RF, IR, Zigbee, Z-wave, etc.). However, the system can additionally or alternatively include any other suitable communication modules.

[0037] The power module can include one or more power input elements, power storage elements, and/or any other suitable elements. The power module is preferably an electrical power module with an electrical input (e.g., electrical power connection such as a wired connector or inductive loop) and/or electrical storage element (e.g., battery, supercapacitor, etc.), but can additionally or alternatively include any other suitable power input and/or storage elements. The power module can include a battery that is preferably electrically coupled (e.g., connected by conductive wires) to the powered system components, wherein the computational module preferably controls power provision (e.g., as described below), but power provision and/or battery management can additionally or alternatively be performed by any other suitable components.

[0038] The computational module can include one or more processors (e.g., CPU or other microprocessor, control circuit, relay system, etc.), computer memory modules (e.g., RAM), computer storage modules (e.g., hard disk drive, flash memory, etc.), and/or any other suitable elements. The computational module is preferably configured to control and/or receive information from the outputs, inputs, communication modules, power modules, and/or any other suitable elements of the system. The computational module can be distributed across multiple systems (e.g., remote server, personal computing device, wearable computing device, mobile computing device, etc.) and/or in the cloud, or can alternatively be implemented in a single computing system.

[0039] The computational module is preferably configured to control the controlled subsets (e.g., output units such as tactile interface devices, groups of output units, etc.) individually. In a first example, the processor is configured to provide control signals to each controlled subset (e.g., to a control element of each controlled subset, such as an actuator control circuit). Additionally or alternatively, in a second example, the processor is configured to selectively provide power from the power module to each controlled subset (e.g., by regulating the current provided to each output unit) or to selectively command each controlled subset to enter a mode or attain a set point parameter value (e.g., by communicating a command to an integrated controller of each output unit). However, the computational module can additionally

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or alternatively be configured to control the controlled subsets in any other suitable manner, or can be configured to not control the controlled subsets.

[0040] As described earlier, the system can include embodiments, variations, and examples of the device(s) described in U.S. App. No. 14/750,626, titled "Providing Information to a User Through Somatosensory Feedback" and filed on 25-JUN-2015; however, the system can additionally or alternatively include any other suitable devices and/or device elements.

4. Method.

4.1 Receiving input signals

[0041] As described in relation to the method 100 above, Block S110 recites: receiving an input signal from a sensing device associated with a sensory modality of the user. Block S110 functions to provide signals that can be transformed into stimuli provided to the user in downstream steps of the method 100. The input signals are preferably received by and/or derived from one or more sensors of the system described in Section 3 above. In particular, the input signals can be received from sensors of the system (e.g., information sampled by the sensors), other sensors (e.g., sensors connected to the system, such as by a communication module), computing systems (e.g., from computer storage, generated by the computing system, etc.), other systems, and/or any other suitable source.

[0042] The input signals can capture information associated with one or more sensory modalities (e.g., audio, visual, tactile, olfactory, etc.), and/or any other information associated with (e.g., indicative and/or representative of, sampled based on, etc.) a sensory experience (e.g., associated with the environment of the system and/or user, a remote environment, a virtual environment, etc.). The input signals can additionally or alternatively capture non-sensory information, such as information associated with an environment (e.g., the environment of the system and/or user, a remote environment, a virtual environment, etc.). For example, the input signals can include location, speed, acceleration, orientation (e.g., relative to a reference orientation and/or position of the user or of a vehicle occupied by the user), electric and/or magnetic field information (e.g., intensity, orientation, gradient, curl, etc.), navigation information (e.g., turn-by-turn directions), and/or any other suitable information, as described in relation to system components in Section 3 above.

[0043] The input signals received in Block S110 preferably include current information (e.g., sent in near real-time to the system, such as streamed substantially concurrent with

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sampling). The input signals received in Block Sno can additionally or alternatively include advance information (e.g., associated with a sensory experience that is expected to occur at a later time, preferably along with the expected time of occurrence), but can additionally or alternatively include historical information and/or information associated with any other suitable time (or no time).

[0044] In a first variation, Block Sno includes receiving audio signals (e.g., from a microphone system, etc.) derived from entities and/or objects in a user's environment. In this variation, receiving the audio signals can include sampling audio information at one or more microphones of a system coupled to a user or otherwise in proximity to the user, as described in relation to the system embodiments of Section 3 above, wherein using signals from multiple microphones can be used in downstream processing steps, as described in more detail below.

[0045] In one example, the audio signals can capture human communication content, from which speech components (e.g., phonetic components, etc.) can be processed, extracted, and transformed to provide stimuli to users, wherein the stimuli convey speech information (or information derived from the communication information) to the user through another sensory modality. In another example, the audio signals can capture communication from a non-human entity, from which communication components can be processed, extracted, and transformed to provide stimuli to users, wherein the stimuli convey information to the user through another sensory modality. In another example, the audio signals can capture non-communication information associated with entities or objects in the user's environment, from which features can be processed, extracted, and transformed to provide stimuli to users, wherein the stimuli convey information (or information derived from the speech information) to the user through another sensory modality. In a first specific example of this example, information can be associated with environmental hazards (e.g., alarms, vehicle traffic, hazardous conditions in proximity to the user), notifications (e.g., door bell rings, appliance notifications, etc.), and/or any other suitable environmental information that would be useful for the user to perceive. In a second specific example, information can be associated with a continuous representation of environmental sounds (e.g., associated with features such as sound frequency).

[0046] In variations, the audio signals can be received as an analog electrical representation (e.g., line in), a digital audio encoding (e.g., computer audio stream or file), and/or in any other suitable form. In these variations, Block S110 can additionally or alternatively include receiving timing information associated with the audio information (e.g.,

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synchronization information, such as the time at which a portion of the audio information was captured from the user's environment, etc.). However, Block Sno can additionally or alternatively receiving any other suitable input information (e.g., olfactory stimuli, taste stimuli, etc.) in any other suitable manner.

4.2 Preprocessing Input Signals

[0047] Block S120 recites: generating a preprocessed signal upon preprocessing the input signal with a set of preprocessing operations, which functions to process out undesired signal components from the input signal(s) received in Block S110, and/or perform suitable preprocessing operations on the input signal to facilitate downstream portions of the method 100. Block S120 is preferably implemented at the processing system components in communication or otherwise coupled to the sensor components associated with Block S110 and described in Section 3 above; however, Block S120 can additionally or alternatively be implemented using any other suitable system components.

[0048] In variations, Block S120 can include filtering out signal components associated with noise and/or attenuating or accentuating signal components in any other suitable manner, in order to increase the signal-to-noise ratio (SNR) of input signal(s). Block S120 can additionally or alternatively include filtering or otherwise processing frequency components of the input signal associated with or not associated with specific hearing conditions of the user(s) involved. For example, Block S120 can include isolating high frequency components of the input signals for downstream processing according to subsequent blocks of the method 100, in order to provide information to users with high frequency hearing loss. In more detail, isolation of frequency components (or ranges of frequency components) can implement an algorithm that prioritizes features of interest to the user (e.g., based on sensory condition details, based on typical user preferences, based on personal interest, based on professional interests, etc.) or de-prioritizes features not of interest to the user (e.g., for a user lacking auditory sensitivity in a high-frequency band but having strong auditory sensitivity in a low-frequency band, including many or all features associated with inputs in the high-frequency band but excluding some or all features associated with inputs in the low-frequency band). However, Block S120 can include post-processing or pre-processing the feature sets in any other suitable manner.

[0049] In variations, Block S120 can implement one or more digital techniques including one or more of: of an infinite impulse response (IIR) filter, a finite impulse response (FIR) filter,

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high pass filter, a low pass filter, and a band pass filter operation for processing signals in frequency ranges of interest.

[0050] In relation to noise reduction, Block S120 can implement one or more noise reduction techniques including gating operations, expanding operations, operations to remove hum (e.g., in relation to a mains supply frequency and associated harmonics), operations to remove buzz (e.g., in relation to a mains power supply, waveform distortion, and/or harmonics), operations to remove clicks, operations to remove crackle, operations to remove hiss, and any other suitable noise reduction operation. In specific examples, Block S120 can implement one or more of a spectral subtraction operation and an adaptive filtering operation to de-noise incoming audio signals. In variations related to other types of input signals, Block S120 can use any other suitable filtering technique/noise reduction technique. As shown in example FIGURES 4A and 4B, digitizing can occur upstream or downstream of filtering/attenuation operations.

[0051] Block S120 can additionally or alternatively implement a separation operation to separate the input signal(s) into multiple signals associated with different sources. In the context of signals capturing speech content, separation can include separating the input signals into a first portion that includes the speech content and at least one other portion that includes non-speech content. In the context of signals capturing environmental audio, separation can include separating the input signals into a first portion associated with a first classification of objects (e.g., transportation-related objects), a second portion associated with a second classification of objects (e.g., pets/animals), a third portion associated with a third classification of objects (e.g., appliances), a fourth portion associated with a fourth classification of objects (e.g., people), and any other suitable number of portions. In the context of signals capturing musical content, separation can include separating the input signals into a first portion that includes a first portion (e.g., associated with melody), a second portion (e.g., associated with vocals), a third portion (e.g., associated with instrumentals), and any other suitable number of portions. Separation operation(s) associated with any other suitable type(s) of input signal can, however, be implemented in any other suitable manner.

[0052] Additionally or alternatively, in some variations, Block S120 can implement a beam forming operation with multiple microphones to remove artifacts (e.g., reverberation artifacts) introduced by the environment of the user. The beam forming operation can include a spatial filtering technique that produces constructive interference of desired signal components

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(e.g., associated with speech) from multiple sensors (e.g., microphones, accelerometers, etc.), and/or produces destructive interference of undesired signal components (e.g., from the ambient environment) from multiple sensors (e.g., microphones, accelerometers, etc.). The beam forming operation can include control of phasing, relative amplitude and/or any other suitable aspect of signals from each sensor/microphone involved in the process. The beam forming operation can be conventional (e.g., using fixed or switched beam beamformers), or can be adaptive (e.g., using a phased array). The beam forming operation can, however, be implemented in any other suitable manner using any suitable number or type(s) of sensors/microphones.

[0053] Block S120 can include implementing a framing operation with the input signal, in order to facilitate latency aspects, and in order to facilitate processing of incoming input signals in an efficient and highly accurate manner. The framing operation can implement any suitable segmenting process to generate frames from the input signal, such that the frames can be processed to identify features of interest (i.e., from Block S130), and/or frames can be labeled accordingly in relation to machine learning operations that improve efficiency of input signal processing for specific user demographics. The frames can be uniformly sized, or can alternatively be non-uniformly sized. Furthermore, the frames can overlap, or alternatively, the frames may not overlap. The method 100 can include performing elements of the method for each frame (e.g., repeating Blocks S120-S160 for each frame), and/or performing analysis on the frames in any other suitable manner. In an example, the framing operation processing a 16 kHz input audio signal into 20ms frames, wherein the 20ms frames have 10ms of overlap with adjacent frames. However, in variations the input signal can have any suitable characteristic frequency, the frames can have any other suitable size, and the frames can have any other suitable overlapped or non-overlapped configuration.

[0054] Pre-processing in Block S120 can additionally or alternatively include implementing a windowing operation (e.g., subsequent to the framing operation). In specific examples, the windowing processing includes an AKB window, Hann window, and/or Kaiser window. Pre-processing in Block S120 can additionally or alternatively implement one or more of: zero-padding, normalization, subsampling within frames or across frames, and any other suitable pre-processing step, in order to facilitate downstream processing steps according to the method 100.

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[0055] Pre-processing in Block S120 can additionally or alternatively include implementing transformation operations (e.g., functional decomposition operations such as Fourier-related transforms) with outputs of the framing operation and/or any other pre-processing steps including one or more of: a discrete cosine transform (DCT) operation, a modified discrete cosine transform (MDCT) operation, a fast Fourier transform (FFT) operation, a discrete Fourier transform (DFT) operation, a Mel-frequency Cepstral Coefficient (MFCC) operation, a wavelet transformation operation, a McAulay-Quatieri (MQ) operation, a Fast Hartley transformation operation, and any other suitable transformation operation, from which features of interest can be extracted in Block S130.

4.3 Extracting Features

[0056] Block S130 recites: extracting a set of features from the preprocessed signal, which functions to generate features that can be processed with one or more neural networks, as described in relation to Block S140 below. In more detail, Block S130 extracts features from the pre-processing operation, which can be provided to the neural network systems of Block S140 to generate or facilitate recognition of components of the input signal efficiently, for eventual encoding and mapping to haptic device outputs. Block S130 is preferably implemented at the processing system components in communication or otherwise coupled to the sensor components associated with Block S110 and described in Section 3 above; however, Block S130 can additionally or alternatively be implemented using any other suitable system components.

[0057] In the context of speech information from the input signals, Blocks S130 and S140 can facilitate generation of features that can ultimately be used for transmitting of information from speech components (e.g., phonemes, words, senones, subphones, diphones, triphones, quinphones, utterances, fillers, etc.) to be perceived by the user in Blocks S150 and S160. However, in the context of other input signals, Blocks S130 and S140 can be used for recognition of any other suitable information components from the input signal(s), for transmission of appropriate stimuli to users in Blocks S150 and S160.

[0058] Block S130 can include generating derived features associated with spectral/frequency from the pre-processing operations of Block S120. In variations, derived features can be associated with one or more of: spectral peak frequencies, spectral peak magnitudes, spectral rolloff aspects, spectral centroid aspects, frequency band features (e.g., energy ratios), gammatone transforms (e.g., gammatone transform coefficients), measures of

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spectral deformation, measures of spectral width, zero-crossing features (e.g., zero crossing rates), moments of crossing intervals, lacunarity, whitening transforms (e.g., elements of a whitening transform matrix), and any other suitable derived features.

[0059] Additionally or alternatively, Block S130 can include generation of any other suitable features, in relation to any other suitable input signal type and/or encoded information associated with the stimuli provided in subsequent blocks of the method 100.

4.4 Neural Network Operations

[0060] Block S140 recites: processing the set of features with a neural network system, which functions to transform the features of Block S130 into outputs that can be encoded and mapped in a manner for provision of stimuli to the user as described in relation to Blocks S150 and S160 below. Block S140 is preferably implemented at the processing system components described in Section 3 above. In one variation, Block S140 is implemented on embedded hardware (e.g., of the stimulation device, of the device(s) including sensors for generation of the input signals) and/or on a mobile computing device in communication with one or more devices of the system, etc.), with or without supplemental digital signal processors (DSPs). However, Block S130 can additionally or alternatively be implemented using any other suitable system components.

[0061] In Block S140, the neural network operations can include one or more of fully connected configurations, convolutional configurations, and recurrent configurations, combinations of multiple network configurations (e.g., as in batch normalization designs, skip connection designs, multiplicative integration designs, etc.). In variations, the neural network(s) implemented in Block S140 can include one or more of: recurrent neural networks (e.g., with a long short term memory design, with a gated recurrent unit design, etc.), convolutional neural networks, feedfoward neural networks, deep neural networks, and any other suitable variant of neural network. Additionally or alternatively, the neural network(s) implemented in Block S140 can be supplemented with statistical models for reinforcement learning and pattern recognition of components of interest from input signals, wherein such statistical models can include one or more of: Hidden Markov Models (HMMs), language models, mixture models (e.g., Gaussian mixture models), and/or any other suitable statistical models. In a specific example, represented in FIGURE 5, Block S140 can implement a convolutional neural network with a convolutional layer having a dimension smaller than that of the input layer, with a recurrent neural network

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design and a Hidden Markov Model for learning/recognizing speech components (e.g., phonemes, words, senones, subphones, diphones, triphones, quinphones, utterances, fillers, etc.). In relation to the specific example, the neural networks can include additional inputs to any layer and/or modification of weights associated with network components. Additionally or alternatively, the neural networks can incorporate one or more of: a network selector, a volume normalizer, information from additional sensors for learning of a noise environment associated with the input signal(s), and any other suitable data/information.

[0062] In relation to additional sensors to enhance learning and recognition facilitated by the neural network(s), Block S140 can leverage data from one or more of: motion sensors (e.g., accelerometers, gyroscopes) for beam forming to learn signal source aspects; location identifying modules (e.g., GPS systems) for selecting networks (e.g., localizing to accents associated with speech content); barometers for learning environmental pressure characteristics; light sensors for learning environmental light characteristics; temperature sensors for learning environmental temperature characteristics; air flow meters; current sensors (e.g., Hall effect sensor); voltmeters, touch sensors (e.g., resistive, capacitive, etc.); proximity sensors; force sensors (e.g., strain gauge meter, load cell); vibration sensors; chemical sensors; and/or any other suitable sensors for learning signal components associated with speech content, the environment of the user, and/or any other suitable input signal components.

[0063] The neural networks can be trained (e.g., with dropout and stochastic gradient-based techniques), and in specific examples, can be trained using one or more of: Adam-based methods for efficient stochastic optimization with first-order gradients; second order quasi-Newton methods (e.g., Broyden-Fletcher-Goldfarb-Shanno methods, limited-memory Broyden-Fletcher-Goldfarb-Shanno methods, KFAC methods, etc.), and other methods (e.g., gradient descent methods, Newton's method, conjugate gradient methods, Levenberg-Marquardt methods, etc.). Training data can be augmented with features of the input signal(s), wherein the features can be derived or learned. In examples, the training data features can include or be derived from one or more of: spectral peak frequencies, spectral peak magnitudes, spectral rolloff aspects, spectral centroid aspects, frequency band features (e.g., energy ratios), gammatone transforms (e.g., gammatone transform coefficients), measures of spectral deformation, measures of spectral width, zero-crossing features (e.g., zero crossing rates), moments of crossing intervals, lacunarity, whitening transforms (e.g., elements of a whitening transform matrix), and any other suitable derived features.

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[0064] In relation to network configurations, Block S140 can implement compression techniques (e.g., in order to allow such neural networks to run efficiently without supplemental signal processing hardware, as indicated above). Network compression techniques can include one or more of: binarization of weights, trained quantization, Huffman coding, pruning, hashing to exploit redundancy in neural networks to achieve reductions in model sizes, and any other suitable compression technique. In a specific example, compression of the neural network(s) used in Block S140 involves a deep compression process including pruning, trained quantization, and Huffman coding to reduce storage requirements without affecting accuracy. Such a method provides increased efficiency and speed in processing, and increases flexibility in where such neural network(s) can be run.

[0065] In variations of the method 100 for speech recognition, encoding, and mapping, outputs of the neural networks can include frames labeled with speech component features associated with one or more of: phonemes, sub-phoneme components, super-phoneme assemblies, non-phoneme components (e.g., phones, diphones, triphones, diphthongs, triphthongs, etc.), words, sentences, and/or any other suitable language components. In related to derived features, outputs can include frame-wise probabilities of speech components identified, accuracy metrics associated with identified speech components, and any other suitable derived features (which can be processed in a machine learning feedback loop, described in more detail in Section 4.6 below). Outputs of the neural networks can additionally or alternatively include features of environmental objects (e.g., motion characteristics, morphological characteristics, classification aspects, state characteristics), features associated with indications of hazards to the user, features associated with other environmental information (e.g., in relation to changes in environmental states that may not be associated with hazards), and any other suitable features. Outputs of the neural networks can additionally or alternatively include any other suitable neural network outputs.

[0066] Block S140 can additionally or alternatively include other feature-output transformation techniques (e.g., not using neural networks)

4.5 Mapping and Producing Haptic Outputs

4.5.1 Encoding and mapping

[0067] Block S150 recites: mapping outputs of the neural network system to a device domain associated with a device including a distribution of haptic actuators in proximity to the

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user. Block S150 functions to encode and map feature- and/or parameter value-derived outputs of the neural network system of Block S140, for use in controlling outputs of the stimulation devices of Block S160. As such, Block S150 facilitates transformation of speech component outputs (or other outputs associated with input signals) from the neural network system of Block S140, into stimuli that can be delivered to the user at a device in proximity to the user.

[0068] In specific examples, Block S150 preferably includes encoding and mapping of speech components (e.g., frequency coefficient amplitudes, peak frequency values, phonemes, words, etc.) to specific device elements and/or stimulation parameters. Mappings between speech components (or other components of interest extracted from the input signals) can be associated with actuators of the array of tactile interface devices in a 1:1 manner or alternatively, not in a 1:1 manner. As such, Block S150 can include encoding and/or mapping complex waveforms associated with stimulation parameters of a subset of the array of tactile stimulation devices (e.g., to create stimulation "textures" associated with different components of interest). However, Block S150 can include encoding and/or mapping in any other suitable manner.

[0069] In one variation, Block S150 encodes the outputs of the neural network system of Block S140 to haptic patterns executable using the array of tactile interface devices described in Section 3 above, wherein the haptic patterns are associated with control signals that activate devices of the array of tactile interface devices, and wherein the control signals can be executed in Block S160 of the method 100. In variations of Block S150 associated with speech component-associated outputs, Block S150 can include can encoding each of the outputs with a spatial aspect and/or device stimulation parameter of the array of tactile interface devices. In relation to speech components described, the Block S150 can transform, encode, or otherwise map outputs derived from the neural network operation(s) of Block S140 to one or more of: subdomains (e.g., subregions, sub-clusters, sublayers, etc.) of the array of tactile interface devices; different stimulus aspects associated with the array of tactile interface devices; and any other suitable aspects of the array of tactile stimulus devices.

[0070] Speech components of Block S140 can be mapped to domains (e.g., layers, regions, clusters, areas, etc.) of the array of tactile interface devices, examples of which are shown in FIGURE 6. As such, different speech components (e.g., frequency locations of formants, peak frequency amplitudes, phonemes, sub-phoneme components, super-phoneme assemblies, phones, diphones, triphones, diphthongs, triphthongs, etc.) can be mapped to different domains of the array of tactile interface devices. For instance, in a device variation that

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has a distribution of the array of tactile stimulation devices configured about a wristband wearable: each device of the array of tactile stimulation devices can be associated with a corresponding phoneme or word, such that different devices of the array of tactile stimulation devices can "play" phonemes/words in a specific pattern that corresponds to the message of the communication data of Block Sno, and can be detected at a wrist region of the user.

[0071] In another example, in a device variation that has a distribution of the array of tactile stimulation devices integrated with a wearable system or other support system in proximity to the user: each device of the array of tactile stimulation devices can be associated with a corresponding phoneme or word, such that different devices of the array of tactile stimulation devices can "play" phonemes/words in a specific pattern that corresponds to the message of the communication data of Block Sno, and can be detected at a body region of the user that is receptive to touch sensations. However, variations of the example can associate devices of the array of tactile stimulation devices with speech components in any other suitable manner.

[0072] In the examples and variations described above, the domains/regions of the array of tactile stimulation devices can be fixed or dynamically modifiable. For instance, the subdomain can be dynamically modified, according to the encodings performed in Block S150, in order to convey a wider variety of information and/or more complex information to the user with a limited physical device space.

[0073] Additionally or alternatively, in variations related to speech components described in Block S140 above, the transformation model can additionally or alternatively transform, encode, or otherwise associate speech component labels with a set with stimulus parameters of the array of tactile interface devices. In variations, the transformation operation can map different speech components (e.g., phoneme pitch, phoneme energy, phoneme tone, phoneme emphasis, etc.) to a range of stimulus types. In variations, stimulus parameters can include one or more of: output type (e.g., intermittent, pulsed, continuous, etc.); pulse pattern; pulse waveform characteristics (e.g., sinusoidal, square wave, triangular wave, wavelength, etc.), output amplitude, output intensity; output duration; out pulse duration, etc.), device domains involved in an output (e.g., a sweeping pattern using multiple devices), and any other suitable stimulus parameter. For instance, in a device variation that has a distribution of the array of tactile stimulation devices configured about a wristband wearable: each device of the array of tactile stimulation devices can output a specific stimulus parameter corresponding to a speech

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component, such that the devices can relay information not only to speech component labels (e.g., phoneme labels), but also more complex language aspects (e.g., phoneme pitch, phoneme energy, phoneme tones, phoneme emphasis, etc.) and can be detected at a wrist region of the user.

[0074] In another example, in a device variation that has a distribution of the array of tactile stimulation devices integrated with a wearable device or other support structure in proximity to the user: each device of the array of tactile stimulation devices can output a specific stimulus parameter corresponding to a speech component, such that the devices can relay information not only to speech component labels (e.g., phoneme labels), but also more complex language aspects (e.g., phoneme tones, phoneme emphasis, etc.) and can be detected at a body region of the user that is sensitive to touch. However, variations of the example can associate stimulus parameters of the array of tactile stimulation devices with speech components in any other suitable manner.

[0075] In variations related to speech components described in Block S140 above, the transformation model can additionally or alternatively transform, encode, or otherwise associate speech component outputs of Block S140 with complex or combined outputs of the array of tactile interface devices. In variations, the transformation operation can result in generation of encodings related to both subdomains and stimulus outputs available using the array of tactile stimulus devices.

[0076] In a first example, associated with the English language, the Block S150 can assign each of 47 phoneme labels to specific devices of the array of tactile interface devices (e.g., distributed about a wristband, distributed across a vest, etc.), such that the array of tactile interface devices can "play back" stimuli associated with different phonemes in an order corresponding to portions of the input signal(s) received in Block S110. As shown in FIGURE 6, a wrist band can include an array of tactile interface devices, each mapped to a specific phoneme, which can be signaled to play the phoneme according to a pattern corresponding to the input signals in Block S110. In a second example, associated with spoken Mandarin, Block S150 can assign each of 41 phoneme labels to specific devices of the array of tactile interface devices and four stimulus patterns (e.g., pulse patterns) associated with four spoken tones, such that the array of tactile interface devices can "play back" stimuli associated with different phonemes and different phoneme tones in an order corresponding to portions of the input signals(s) received in Block S110.

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[0077] Encoding and mapping in Block S150 can additionally or alternatively be implemented in any other suitable manner, such as described in U.S. App. No. 14/750,626, titled "Providing Information to a User Through Somatosensory Feedback" and filed on 25-JUN-2015.

4.5.2 Stimulation Delivery

[0078] Block S160 recites: at the distribution of haptic actuators, cooperatively producing a haptic output representative of at least a portion of the input signal, thereby providing information to the user. Block S160 preferably includes executing control signals operable to deliver stimulation through the array of tactile interface devices (e.g., the output parameters determined in Block S150, etc.) with the distribution of tactile interface devices coupled to the user. Block S150 preferably functions to enable outputs to be delivered to the user through the tactile interface devices, according to the transformation and encoding algorithms of Blocks S120-S140. The control signals can be executed according to methods described in U.S. App. No. 14/750,626, titled "Providing Information to a User Through Somatosensory Feedback"; however, the control signals can additionally or alternatively be executed in any other suitable manner. For instance, Block S160 can include receiving one or more user inputs operable to adjust a gain level, equalizer levels, and/or other aspect(s) of output stimuli, such that the user can customize the intensity of stimuli provided through the array of tactile interface devices (e.g., of all stimuli, of stimuli associated with particular input and/or output characteristics, etc.). However, Block S150 can additionally or alternatively include controlling the output devices in any other suitable manner.

[0079] In the variations and examples described above, phoneme outputs generated in Block S140 and corresponding to the input signal(s) of Block S110 can be encoded, mapped, and delivered through the array of tactile interface devices in a manner similar to the natural timing of speech. In more detail, stimulus provision in Block S160 preferably occurs in real-time or near real-time (e.g., within a time threshold, such as 100 ms, 90 ms, 75 ms, 50 ms, 110 ms, 125 ms, 150 ms, 200 ms, 300 ms, etc.), as represented in FIGURE 7, such that the user perceives tactile feedback substantially simultaneously with reception of input signals in Block S110 (e.g., is unable to discern a delay between the input signal and tactile feedback), with minimal delay. However, delivery of haptic stimuli can alternatively be implemented in a manner that does not mimic natural speech timing. As such, delivery of haptic stimuli can be implemented with any

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suitable speed, frequency, cadence, pauses (e.g., associated with grammatical components of language), gain (e.g., amplitude of stimulation corresponding to "loudness" or punctuation), pattern (e.g., spatiotemporal pattern played using subarrays of the array of tactile interface devices, etc.), and any other suitable output component.

[0080] Stimulus provision in Block S160 can, however, be implemented in any other suitable manner.

4.6 Additional Machine Learning Aspects and Feedback Loops

[0081] While neural network operations are described in Block S140 above, the method 100 can additionally or alternatively implement additional or alternative machine learning techniques for optimization of extraction of speech components or other components from the input signal. The method 100 can additionally or alternatively implement machine learning algorithms having an objective function for optimizing power consumption of the array of tactile interface devices, thereby improving overall device and/or system performance. Additionally or alternatively, machine learning algorithms can be used to optimize stimulation outputs for user specific conditions (e.g., user specific hearing loss), as described in more detail below.

[0082] In one variation, given N tactile interface devices in the array of tactile interface devices and one-hot encoding of speech components (e.g., phonemes), $N+i$ classes can be represented (including a "BLANK" state associated with inactivation of all of the array of tactile interface devices). In this variation, an objective function for machine learning operations can include an optimization of frame-wise cross-entropy among predicted speech component (e.g., phoneme) annotations; however, optimization of parameters in relation to frames of input signal data can be implemented in any other suitable manner. Additionally or alternatively, an objective can include generation of accuracy metrics associated with speech component annotations, wherein in a specific example, log-likelihoods of a phoneme-level accuracy metric can be determined across a set of contiguous frames of input signal data, based on an analysis of correct annotation for each of the set of frames. In more detail, an entire phoneme captured in the set of frames of input signal data can exhibit a high level of the accuracy metric if every frame is predicted to be either correct or BLANK, and at least one frame is predicted to be correct. Such accuracy analyses can then be used to refine annotations of phoneme (or other speech components) in processing subsequent frames of input signal data. Additionally or alternatively, accuracy analyses can be used to modulate stimulus output aspects of the array of

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tactile interface devices, in relation to Block S160 above. For instance, tactile feedback can be scaled to represent accuracy level in relation to predictions of phonemes in frames of the input signal data. Generation and usage of accuracy metrics for optimization can, however, be implemented in any other suitable manner.

[0083] Additionally or alternatively, in some variations, an objective function for machine learning operations can include optimization of power consumption characteristics associated with the array of tactile interface devices (e.g., in relation to specific device constraints). In one specific example, such operations can optimize for sparsity of an encoded representation of a speech component output with respect to delivery of stimulus parameters upon activation of one or more of the array of tactile interface devices, wherein sparsity is optimized to reduce power consumption while still allowing perception of the stimuli by the user. In relation to these variations, a dynamic range of motor activations can be learned from psychophysical analyses of users (e.g., with respect to minimum sensory perception thresholds, with respect to maximum sensory perception thresholds); however, optimizing power consumption under a constraint of stimuli perception by a user can be implemented in any other suitable manner.

[0084] Additionally or alternatively, in relation to optimization of stimulation delivery for specific user or environment conditions (e.g., in relation to user specific hearing loss, in relation to noise environments, in relation to accents, etc.), an example method flow is shown in FIGURE 8A. In more detail, an original system state (e.g., in "factory" conditions) including a device (e.g., wristband) and original-state neural network-based algorithm can be provided to a user. Then, as the user uses the device according to his/her conditions and in his/her environment, data gathered during use can be transmitted back to remote processors (e.g., of a cloud-based system for aggregating and processing user data) to update the original-state neural network-based algorithm to a user data-informed algorithm. The device (e.g., wristband) can then be updated (e.g., in a remote firmware update operation) and the cycle can continue as the user continues to use the device. In an alternative configuration, as shown in FIGURE 8B, the remote processors can be omitted, and the device can be configured to update itself as the user uses the device.

[0085] Furthermore, the method 100 can include any other suitable Blocks operable to promote provision of information to users, through the array of tactile interface devices, in any other suitable manner. For instance, the method 100 can include rapidly training a user to learn

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to correctly identify speech components associated with haptic outputs provided through an array of tactile interface devices, by providing pre-recorded speech with time-locked haptic outputs through the array of tactile interface devices. In a specific application, such a training protocol can allow users with high-frequency hearing loss to help them discriminate between commonly confused higher frequency phonemes (e.g., /th/, /f/, /s/, /h/, /k/, /z/, /b/, /dh/, /t/, /d/, /v/, etc.), in coordination with stimulus provision through the array of tactile interface devices. For example, the method can include providing haptic outputs (e.g., at the array of tactile interface devices) representing phoneme components related to phonemes that users with high-frequency hearing loss (e.g., presbycusis) may have difficulty perceiving. In a first specific example, the method includes providing haptic outputs representing phoneme components (e.g., high frequency phoneme components) including /f/, /z/, /b/, /th/, /dh/, /t/, /d/, /s/, and/or /v/. In a second specific example, the method includes providing haptic outputs representing phoneme components (e.g., high frequency phoneme components) including /th/, /f/, /s/, /h/, and/or /k/. However, variations of the training protocol can alternatively be implemented for users with other impairments, users with no impairments, and/or for any other suitable phonemes or speech components.

[0086] While some variations of machine learning techniques are described above, in relation to steps of the method 100 above, the method 100 can additionally or alternatively utilize any other suitable machine learning algorithms. In variations, the machine learning algorithm(s) can be characterized by a learning style including any one or more of: supervised learning (e.g., using logistic regression, using back propagation neural networks), unsupervised learning (e.g., using an Apriori algorithm, using K-means clustering), semi-supervised learning, reinforcement learning (e.g., using a Q-learning algorithm, using temporal difference learning), and any other suitable learning style. Furthermore, the machine learning algorithm can implement any one or more of: a regression algorithm (e.g., ordinary least squares, logistic regression, stepwise regression, multivariate adaptive regression splines, locally estimated scatterplot smoothing, etc.), an instance-based method (e.g., k-nearest neighbor, learning vector quantization, self-organizing map, etc.), a regularization method (e.g., ridge regression, least absolute shrinkage and selection operator, elastic net, etc.), a decision tree learning method (e.g., classification and regression tree, iterative dichotomiser 3, C4.5, chi-squared automatic interaction detection, decision stump, random forest, multivariate adaptive regression splines, gradient boosting machines, etc.), a Bayesian method (e.g., naïve Bayes, averaged one-

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dependence estimators, Bayesian belief network, etc.), a kernel method (e.g., a support vector machine, a radial basis function, a linear discriminate analysis, etc.), a clustering method (e.g., k-means clustering, expectation maximization, etc.), an associated rule learning algorithm (e.g., an Apriori algorithm, an Eclat algorithm, etc.), an artificial neural network model (e.g., a Perceptron method, a back-propagation method, a Hopfield network method, a self-organizing map method, a learning vector quantization method, etc.), a deep learning algorithm (e.g., a restricted Boltzmann machine, a deep belief network method, a convolution network method, a stacked auto-encoder method, etc.), a dimensionality reduction method (e.g., principal component analysis, partial least squares regression, Sammon mapping, multidimensional scaling, projection pursuit, etc.), an ensemble method (e.g., boosting, boostrapped aggregation, AdaBoost, stacked generalization, gradient boosting machine method, random forest method, etc.), and any suitable form of machine learning algorithm.

4.7 *Alternative feature-output transformations.*

[0087] The method 100 can additionally or alternatively include other feature- output transformation techniques (e.g., not using neural networks, supplementing the neural network techniques described above regarding Block S140, etc.). In one such variation, the method includes transforming frequency-related features of the input signal into output signals.

[0088] A first example of this variation includes: segmenting the input signal into windows (e.g., as described above regarding Block S120) and, for each window: performing a transformation (e.g., DCT and/or other functional decomposition, such as described above regarding Block S120); optionally discarding extraneous portions of the transformation output (e.g., for a user with high-frequency hearing loss, discarding DCT coefficients corresponding to lower-frequency input signal features, such as frequencies easily perceived by the user); and mapping the remaining (e.g., not discarded) transformation outputs (e.g., DCT coefficient magnitudes) to actuator outputs (e.g., as described above regarding Block S150). This example can optionally include performing a dimensionality reduction procedure. For example, if the number of remaining DCT coefficients is greater than the number of haptic output devices, the coefficients can be binned (e.g., into larger frequency bands), and the average magnitude of the coefficients in each bin can be mapped to actuator outputs. The binning can be uniform or non-uniform (e.g., pre-determined and/or dynamically-determined binning; determined based on individual user needs, typical preferences, etc.).

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[0089] A second example of this variation includes: optionally performing a time-domain filtering of the input signal to discard extraneous frequencies (e.g., for a user with high-frequency hearing loss, using a high-pass filter to discard lower-frequencies of the input signal, such as frequencies easily perceived by the user); extracting a plurality of frequency bands (e.g., one for each actuator or controlled subset) from the filtered input signal (e.g., performing parallel bandpass filtering processes on the signal); determining a metric associated with each band (e.g., the envelope of each band); and mapping this metric to actuator outputs. The frequency bands extracted for the actuators are preferably contiguous frequency ranges, but can additionally or alternatively include any suitable frequency bands.

[0090] However, the method 100 can additionally or alternatively include any other suitable feature-output transformation techniques.

4.8 Repetition.

[0091] The method 100 can optionally include repeating any or all of the method blocks (e.g., Blocks S110-S160). In one example, the method 100 include receiving a continuous stream of input information (e.g., real-time audio signals, such as sampled at the microphone systems of the device) in Block S110, and continuously performing Blocks S120-S160 based on the input information (e.g., based on a recently-received subset of the information). In a second example, the method 100 includes receiving bulk input information in Block S110, segmenting the input information into consecutive time windows, and performing Blocks S120-S160 for each time window. However, the method 100 and/or any of its elements can be repeated in any other suitable manner.

[0092] Although omitted for conciseness, the preferred embodiments include every combination and permutation of the various system components and the various method processes. Furthermore, various processes of the preferred method can be embodied and/or implemented at least in part as a machine configured to receive a computer-readable medium storing computer-readable instructions. The instructions are preferably executed by computer-executable components preferably integrated with the system. The computer-readable medium can be stored on any suitable computer readable media such as RAMs, ROMs, flash memory, EEPROMs, optical devices (CD or DVD), hard drives, floppy drives, or any suitable device. The computer-executable component is preferably a general or application specific processing

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subsystem, but any suitable dedicated hardware device or hardware/firmware combination device can additionally or alternatively execute the instructions.

[0093] The FIGURES illustrate the architecture, functionality and operation of possible implementations of systems, methods and computer program products according to preferred embodiments, example configurations, and variations thereof. In this regard, each block in the flowchart or block diagrams may represent a module, segment, step, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the block can occur out of the order noted in the FIGURES. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

[0094] As a person skilled in the art will recognize from the previous detailed description and from the figures and claims, modifications and changes can be made to the preferred embodiments of the invention without departing from the scope of this invention defined in the following claims.

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CLAIMS

We claim:

1. A method for providing information to a user, the method comprising:
   - receiving an input signal from an audio sensing device, the input signal associated with speech;
   - generating a preprocessed signal upon preprocessing the input signal with a set of preprocessing operations for a set of frames of the input signal;
   - extracting a set of features from the preprocessed signal;
   - processing the set of features with a neural network system;
   - mapping outputs of the neural network system to a device domain associated with a limb-worn device including a distribution of haptic actuators in proximity to the user; and
   - in near real time and at the distribution of haptic actuators, cooperatively producing a haptic output representative of speech components of the input signal, thereby providing speech information to the user at the limb-worn device.

2. The method of Claim 1, wherein receiving the input signal is performed contemporaneously with producing the haptic output and delivering stimulation to the user with the haptic output, thereby allowing the user to perceive speech content captured through the input signal, through touch receptors, in near real time.

3. The method of Claim 2, wherein producing a haptic output representative of speech components comprises mapping outputs of the neural network system, associated with high frequency speech components, to the device domain and delivering tactile stimuli representative of the high frequency speech components to the user.

4. The method of Claim 1, wherein speech components represented in the haptic output comprise at least one of: phoneme-associated components and word-associated components.

5. The method of Claim 1, wherein mapping between the distribution of haptic actuators and speech components comprises a 1:1 mapping.

6. The method of Claim 1, wherein receiving the input signal comprises receiving input signals from a set of microphones of the audio sensing device, and implementing a noise removal operation that applies a beam forming operation to the input signals from the set of microphones.

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7. The method of Claim 1, further comprising refining at least one of: generating the preprocessed signal, extracting the set of features from the preprocessed signal, processing the set of features with the neural network system, mapping outputs of the neural network system to the device domain, and producing the haptic output with a training dataset, wherein refining comprises improving power consumption of the distribution of haptic actuators with a user tactile perception constraint.

8. A method for providing information to a user, the method comprising:

- receiving an input signal from a sensing device associated with a sensory modality of the user;
- generating a preprocessed signal upon preprocessing the input signal with a set of preprocessing operations;
- extracting a set of features from the preprocessed signal;
- processing the set of features with a neural network system;
- mapping outputs of the neural network system to a device domain associated with a device including a distribution of haptic actuators in proximity to the user; and
- at the distribution of haptic actuators, cooperatively producing a haptic output representative of at least a portion of the input signal, thereby providing information to the user.

9. The method of Claim 8, wherein the sensing device comprises at least two of: a microphone system, a motion sensing unit, and a location identifying unit, and wherein the sensing device is coupled to the device including the distribution of haptic actuators.

10. The method of Claim 9, wherein the device including the distribution of haptic actuators comprises at least one of a wrist-borne form factor and a torso-coupled form factor in retaining the distribution of haptic actuators proximal a body region of the user during use.

11. The method of Claim 8, wherein generating the preprocessed signal comprises segmenting the input signal into a set of frames, and wherein the method further comprises a) generating an accuracy metric for a predicted speech component captured in at least a subset of the set of frames, and b) modulating a stimulation parameter of the haptic output based upon the accuracy metric.

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12. The method of Claim 8, wherein the neural network system comprises a convolutional layer and a recurrent architecture, and implements a statistical model for recognition of speech components from the input signal.

13. The method of Claim 8, wherein processing the set of features with the neural network system comprises compressing the neural network system with a network compression technique comprising a deep compression process including pruning, trained quantization, and Huffman coding, and executing the compressed neural network system on at least one of embedded hardware of the device and a mobile device of the user.

14. The method of Claim 8, wherein the set of features comprises spectral peak frequencies, spectral peak magnitudes, spectral rolloff-derived features, spectral centroid-derived features, frequency band energy ratios, gammatone transforms, measures of spectral deformation, zero crossing rates, lacunarity, and moments of crossing intervals.

15. The method of Claim 8, wherein the set of preprocessing operations comprises a filtering operation to remove environmental artifacts, a windowing operation, and a transformation operation implemented across a set of frames of the input signal.

16. The method of Claim 8, wherein the haptic output represents a high frequency phoneme components comprising at least one of: a /f/ phoneme, a /z/ phenome, a /b/ phenome, a /th/ phoneme, a /dh/ phenome, a /t/ phenome, a /d/ phenome, a /s/ phoneme, and a /v/ phoneme.

17. The method of Claim 8, wherein receiving the input signal comprises receiving input signals from a set of microphones of the sensing device a motion sensing unit of the sensing device; and wherein the method further includes implementing a noise removal operation that applies a beam forming operation to the input signals based on data from the set of microphones and the sensing device.

18. The method of Claim 8, wherein producing the haptic output comprises delivering a unique waveform using a subset of the distribution of haptic actuators, for each of a set of phonemes captured in the input signal.

19. The method of Claim 8, wherein receiving the input signal is performed contemporaneously with producing the haptic output and delivering stimulation to the user with the haptic output, thereby allowing the user to perceive content captured through the input signal, through touch receptors, in near real time.

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20. The method of Claim 8, wherein the distribution of haptic actuators is arranged circumferentially about a band support structure operable to be positioned at a wrist region of the user during operation of the method.

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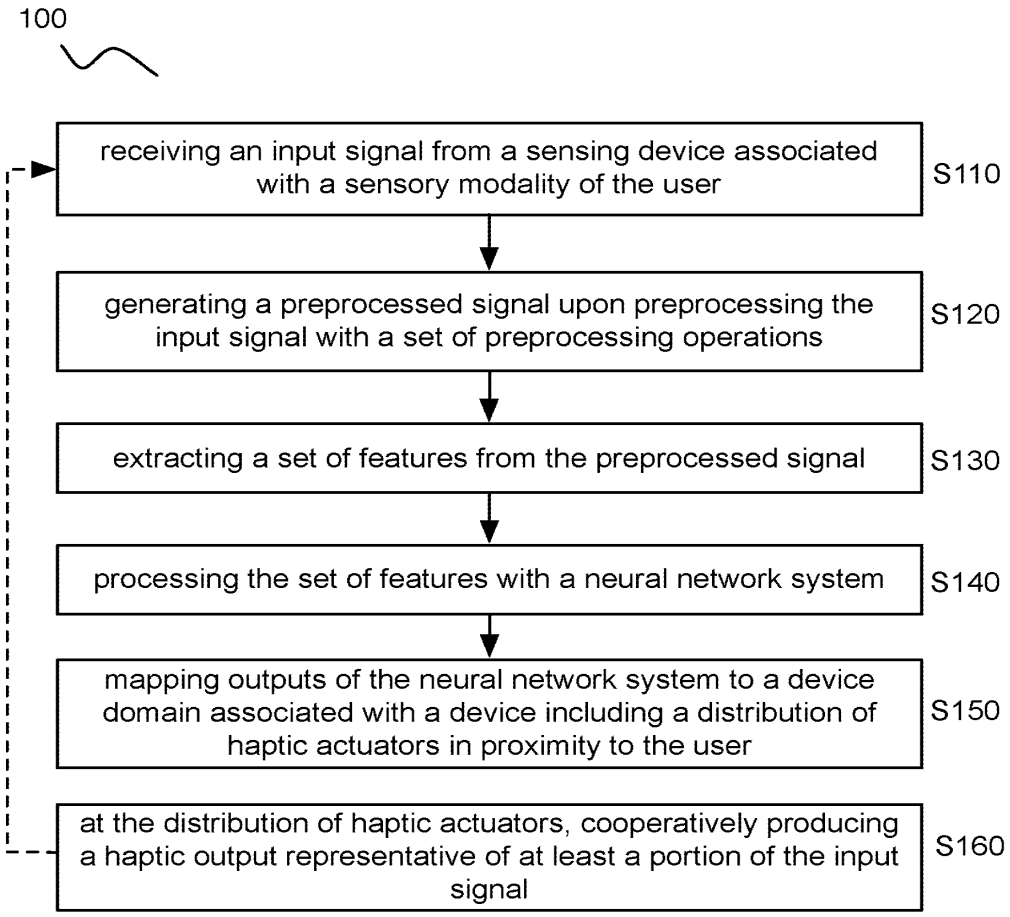

100
receiving an input signal from a sensing device associated with a sensory modality of the user
S110
generating a preprocessed signal upon preprocessing the input signal with a set of preprocessing operations
S120
extracting a set of features from the preprocessed signal
S130
processing the set of features with a neural network system
S140
mapping outputs of the neural network system to a device domain associated with a device including a distribution of haptic actuators in proximity to the user
S150
at the distribution of haptic actuators, cooperatively producing a haptic output representative of at least a portion of the input signal
S160

FIGURE 1A

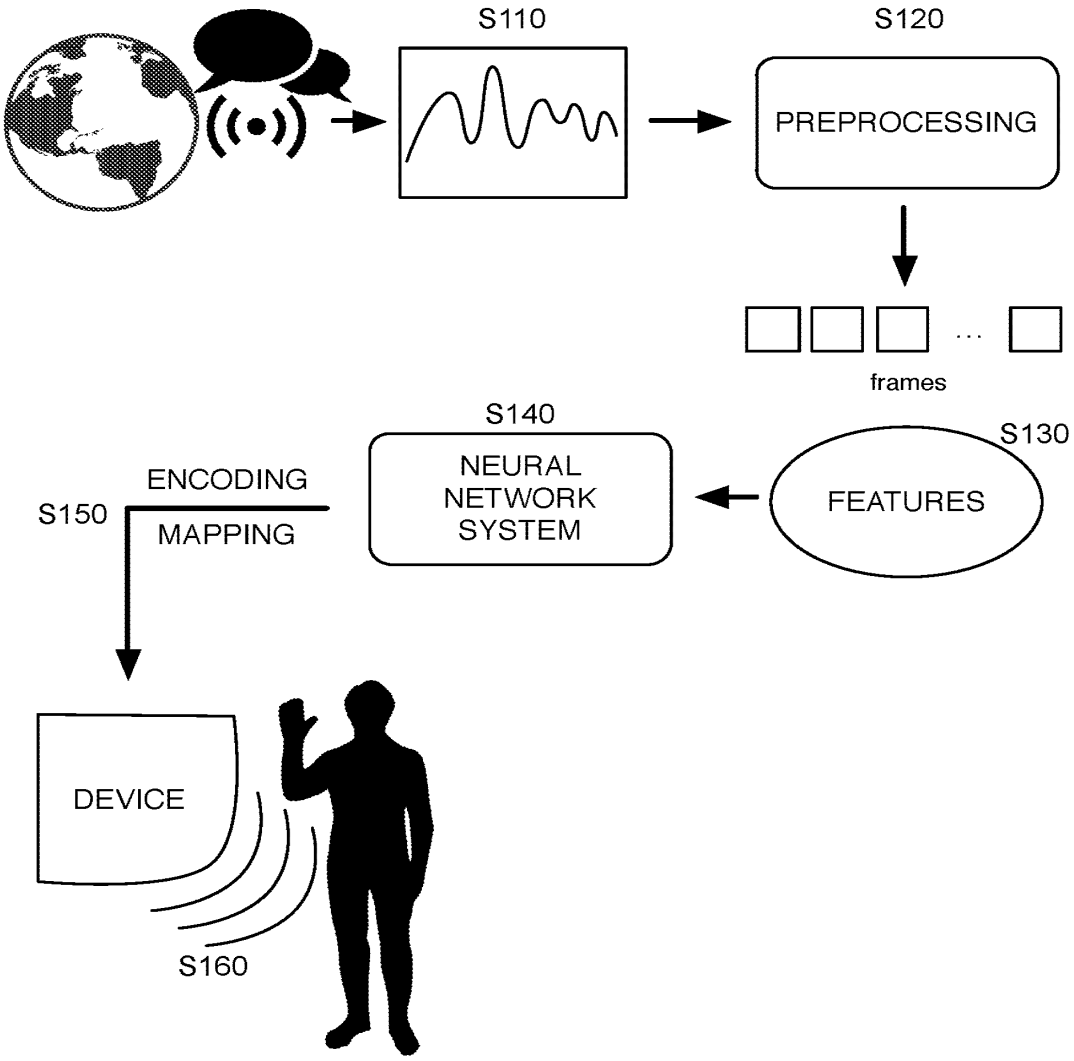

S110
S120
PREPROCESSING
frames
S140
S130
NEURAL NETWORK SYSTEM
FEATURES
ENCODING
S150
MAPPING
DEVICE
S160

FIGURE 1B

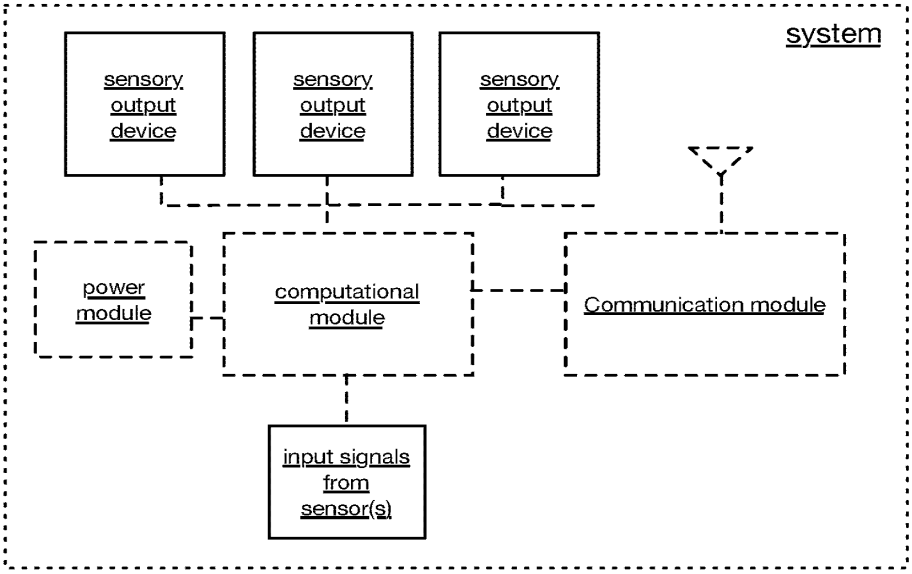


FIGURE 2A

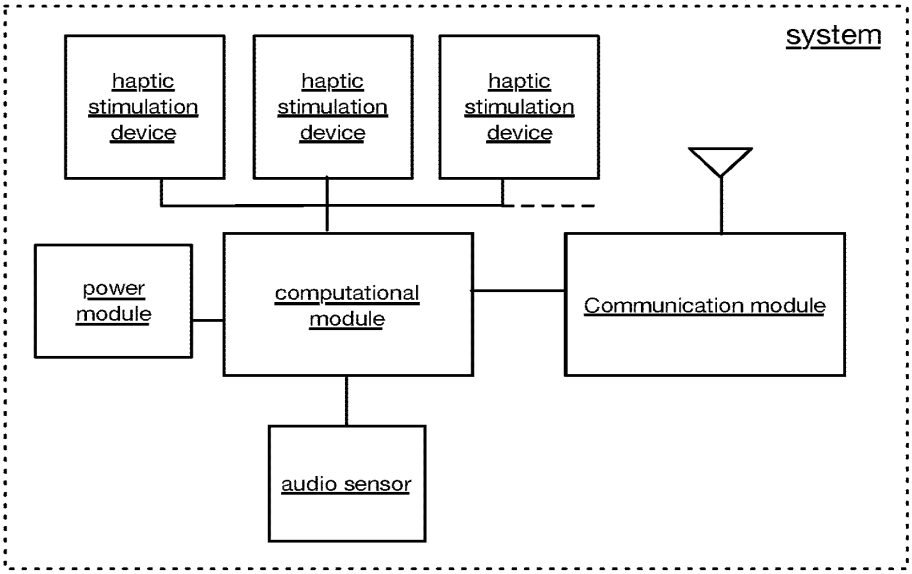


FIGURE 2B

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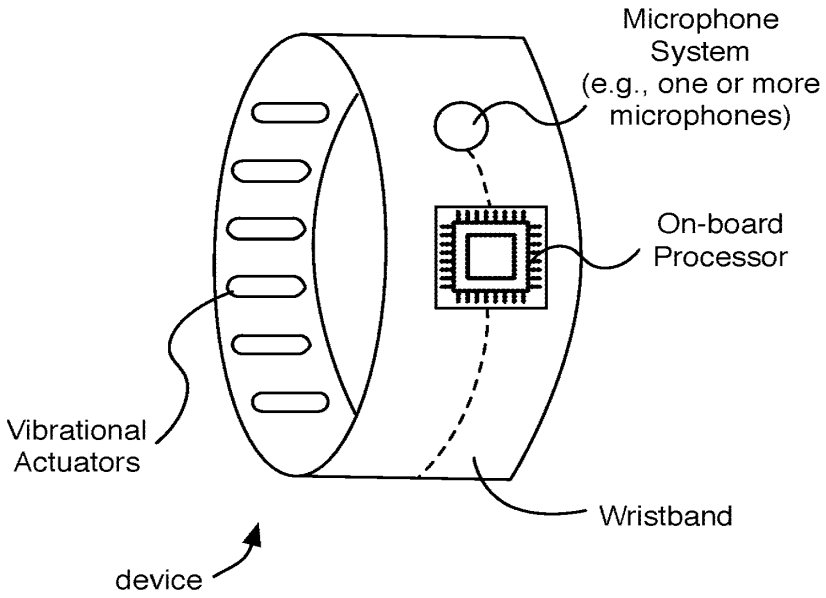


FIGURE 3A

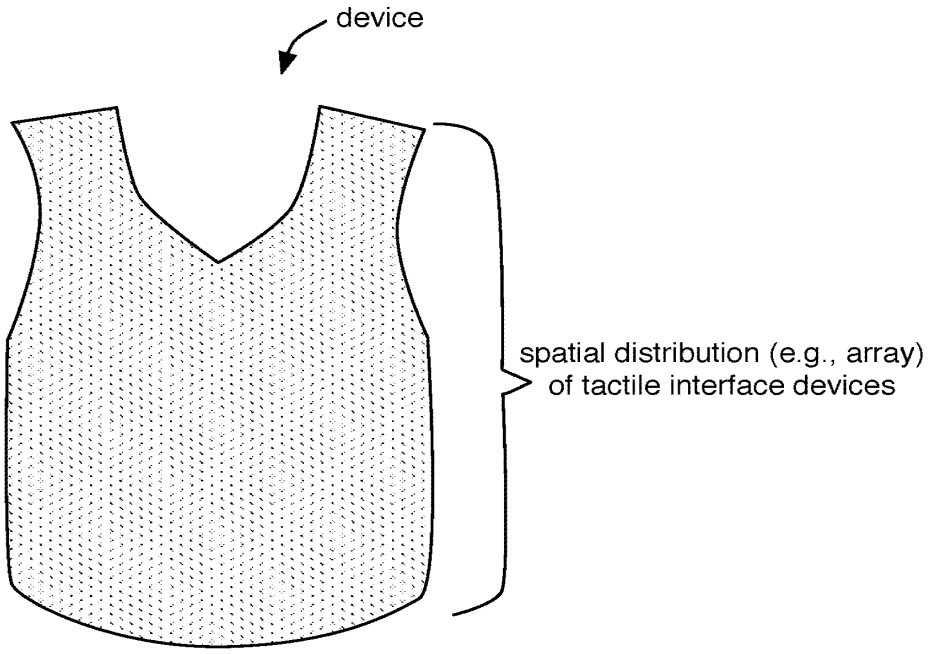


FIGURE 3B

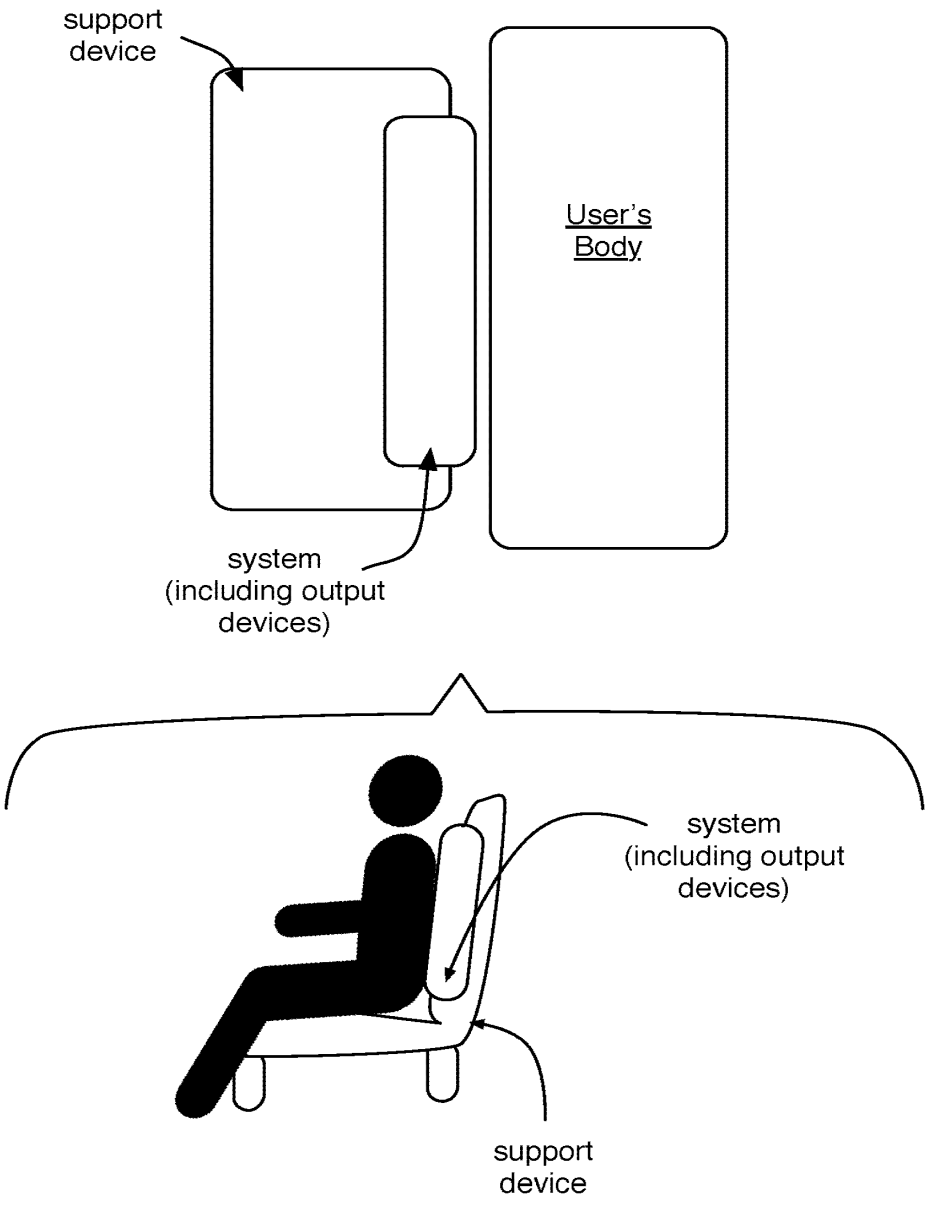

support device
User's Body
system (including output devices)
system (including output devices)
support device

FIGURE 3C

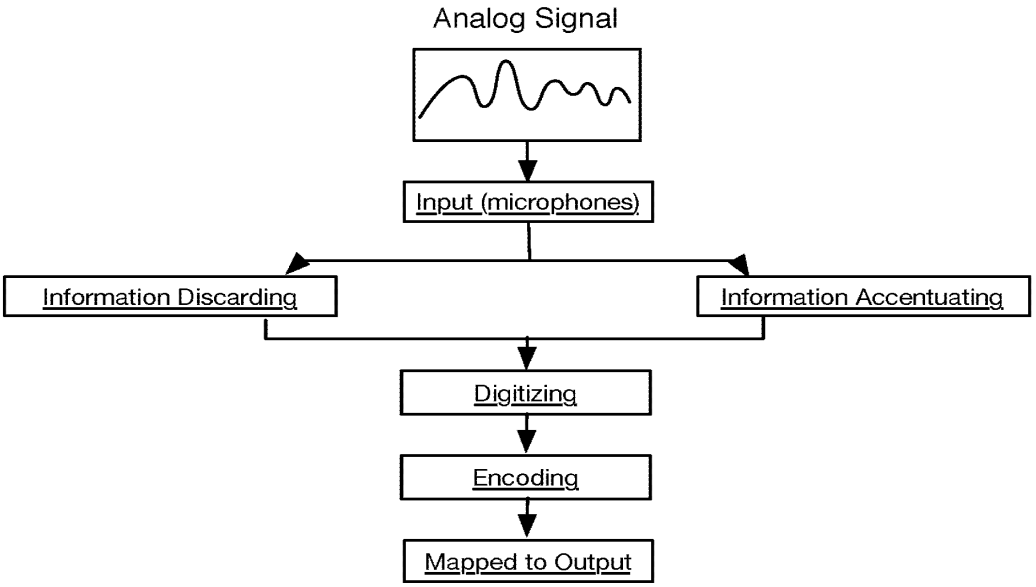


FIGURE 4A

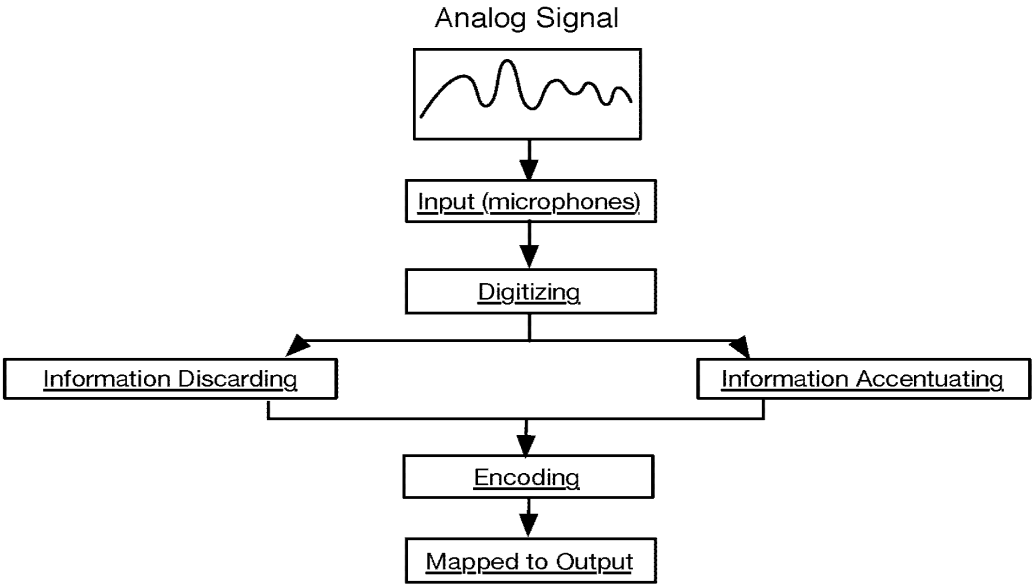


FIGURE 4B

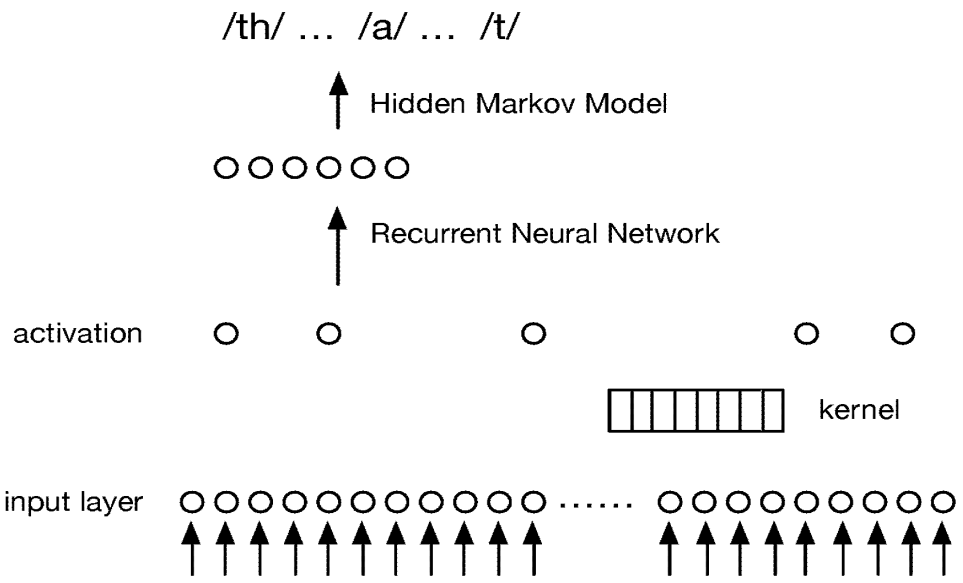


FIGURE 5

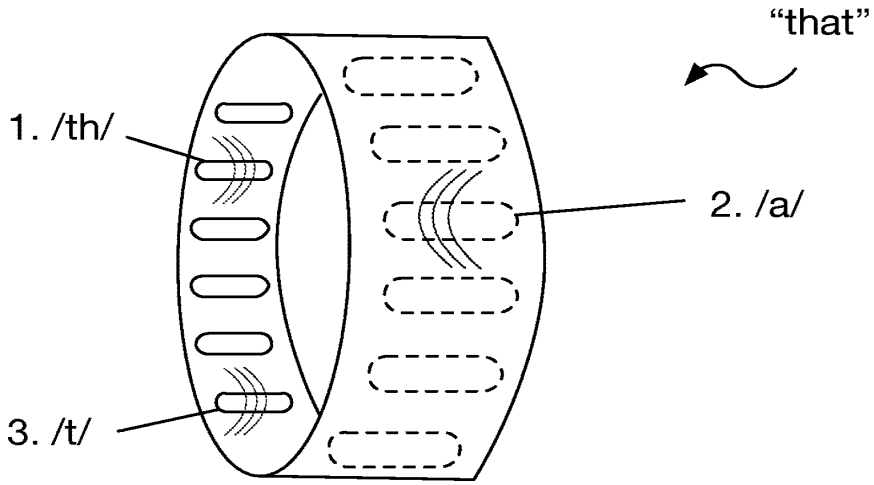


FIGURE 6

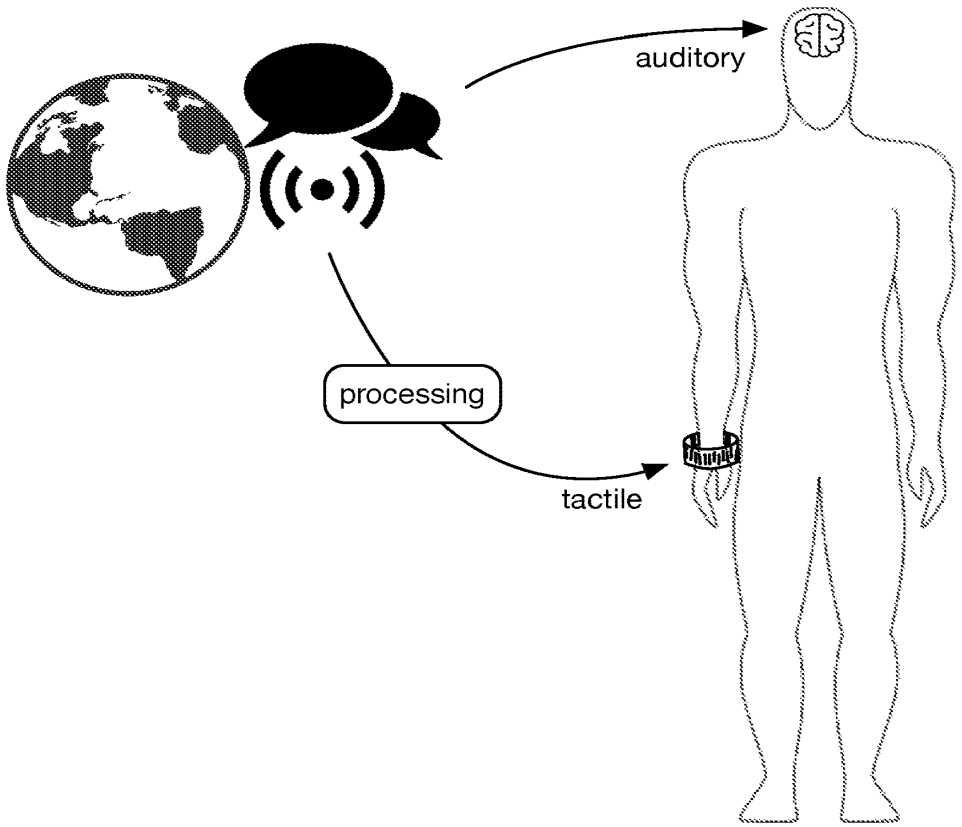


FIGURE 7

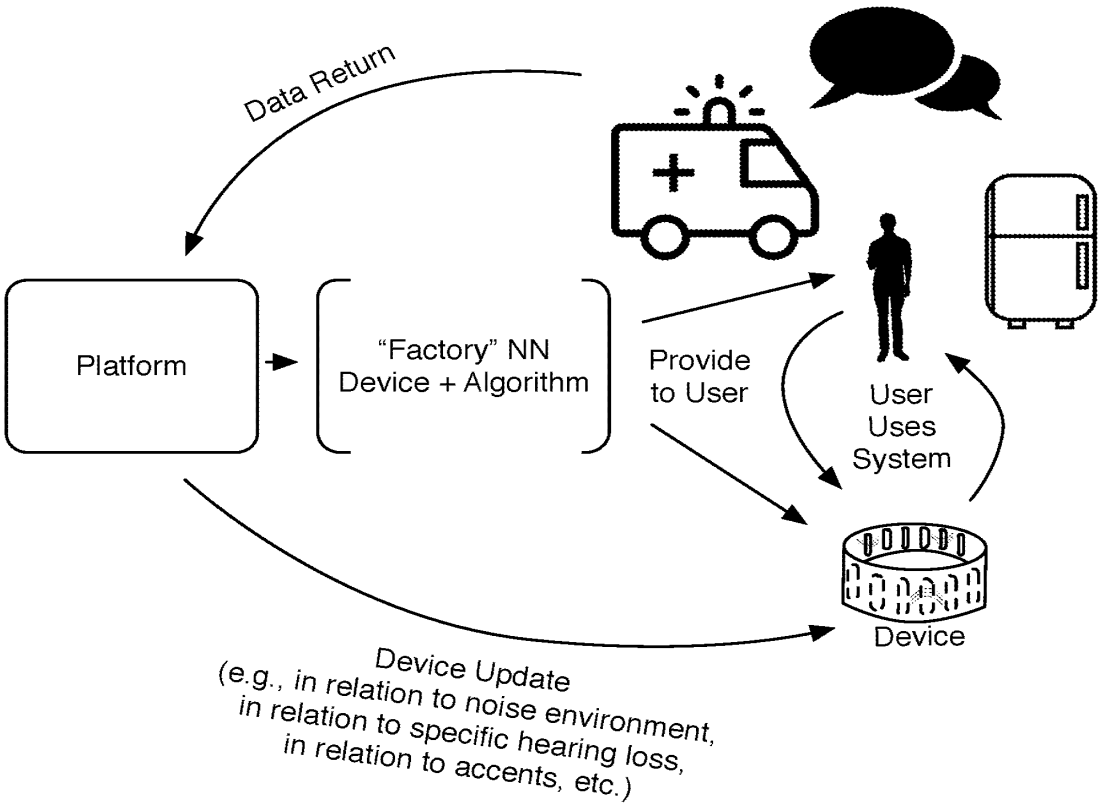

Data Return
Platform
"Factory" NN
Device + Algorithm
Provide
to User
User
Uses
System
Device
Device Update
(e.g., in relation to noise environment,
in relation to specific hearing loss,
in relation to accents, etc.)

FIGURE 8A

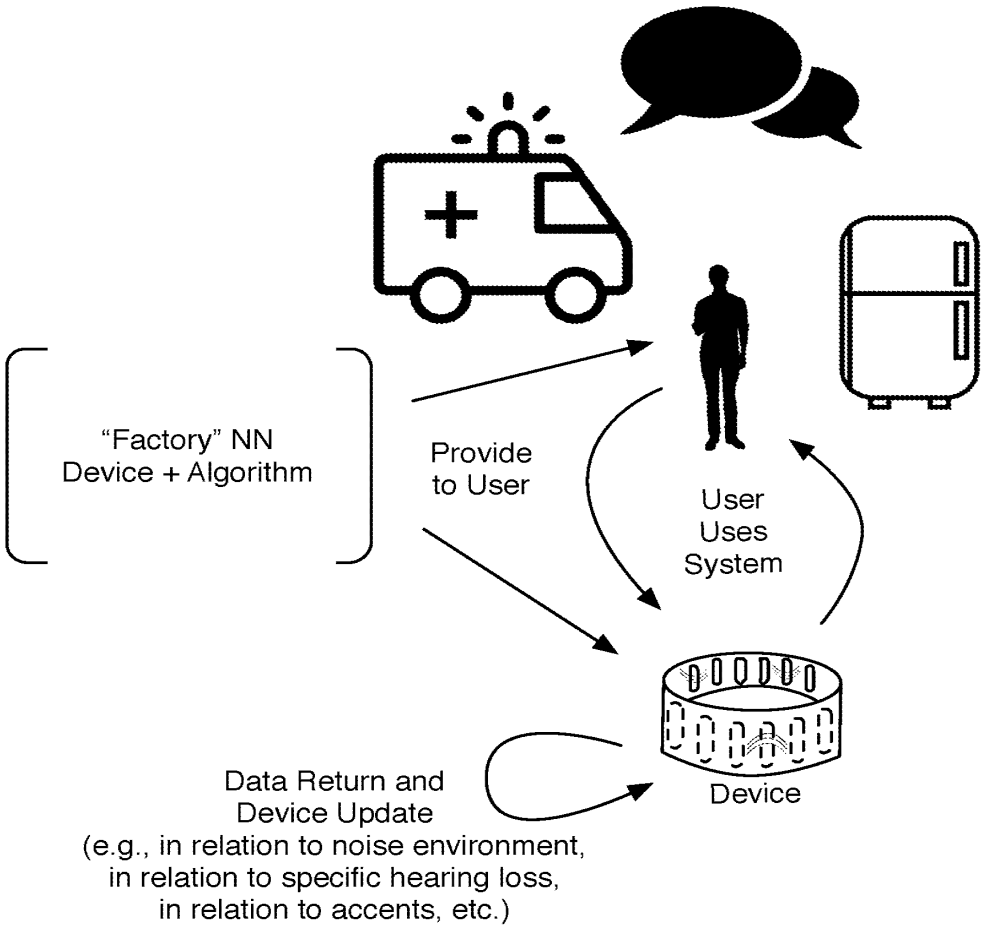

"Factory" NN
Device + Algorithm
Provide
to User
User
Uses
System
Device
Data Return and
Device Update
(e.g., in relation to noise environment,
in relation to specific hearing loss,
in relation to accents, etc.)

FIGURE 8B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US20 17/050288

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61F 11/04; G06F 3/01 ; G08B 6/00; G09B 21/00; G10L 15/16 (2017.01)
CPC - A61F 11/04; A61F 11/045; G06F 3/016; G08B 6/00 (2017.08)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 340/407.1; 367/1 16; 704/232 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2016/0012688 A1 (BAYLOR COLLEGE OF MEDICINE et al) 14 January 2016 (14.01.2016) entire document	1-11, 15-19 --- 12-14, 20
Y	US 2016/0187987 A1 (IMMERSION CORPORATION) 30 June 2016 (30.06.2016) entire document	12, 20
Y	US 2015/0025895 A1 (DOLBY INTERNATIONAL AB) 22 January 2015 (22.01.2015) entire document	13
Y	US 2014/0363138 A1 (KEEVIO INC) 11 December 2014 (11.12.2014) entire document	14

☐ Further documents are listed in the continuation of Box C. ↓↓ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
23 October 2017

Date of mailing of the international search report
08 NOV 2017

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450
Facsimile No. 571-273-8300

Authorized officer
Blaine R. Copenheaver
PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

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DocCode - SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 18526980 Document Date: 12/01/2023

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PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT8307332

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
MATTHEW R LEAPER	12/01/2023

RECEIVING PARTY DATA

Name:	DATAFEEL INC.
Street Address:	1039 SOUTH 21ST STREET UNIT #1
Internal Address:	ATTN: MATTHEW LEAPER
City:	OMAHA
State/Country:	NEBRASKA
Postal Code:	68108

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	18526980

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Email: uspto@datafeel.com
Correspondent Name: MATTHEW LEAPER
Address Line 1: 1629 K STREET NW
Address Line 2: SUITE 300
Address Line 4: WASHINGTON, D.C. 20006

ATTORNEY DOCKET NUMBER:	DF-P01-US08
NAME OF SUBMITTER:	MATTHEW R. LEAPER
SIGNATURE:	/MATTHEW R. LEAPER/
DATE SIGNED:	12/03/2023
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 2
source=DF-P01-US08_Comb_DA_AS-RECORDED#page1.tif
source=DF-P01-US08_Comb_DA_AS-RECORDED#page2.tif

ASSIGNMENT AND DECLARATION

ASSIGNMENT

WHEREAS, I, **MATTHEW ROBERT LEAPER**, have invented certain new and useful improvements as described in a U.S. nonprovisional patent application entitled **"COMMUNICATION DEVICES, METHODS, AND SYSTEMS"** and identified by the United States Patent and Trademark Office ("USPTO") as Application No. 18/526,980 filed **December 1, 2023** (the "Invention").

WHEREAS, **DATAFEEL INC.**, a corporation existing under the laws of the State of Delaware, and having a mailing address of 1629 K Street NW, Suite 300, Washington, D.C., 20006 (together with its successors and assigns, the "Assignee") seeks to memorialize its ownership of the entire right, title, and interest in and to the Invention.

NOW, THEREFORE, in exchange for good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, I transfer to Assignee my entire right, title, and interest in and to the Invention, including all inventions disclosed or claimed in the above-identified patent application, including any improvements thereof, any corresponding domestic applications, and any other corresponding provisional, non-provisional, divisional, continuation, continuation-in-part, reexamination, and/or reissue patent), any corresponding international applications, any corresponding foreign applications, all patents issuing thereon, or other patent applications based off or claiming priority to the above-identified patent application, and all rights and benefits under any applicable treaty or convention authorize the USPTO (or foreign equivalent thereof) to issue any patent (or similar legal protection) to the Assignee.

I hereby authorize the Assignee (or its designee) to apply for patent (or similar legal protection) in its own name if desired, in any and all countries.

I represent to the Assignee that I have not and shall not execute any writing or do any act whatsoever conflicting with this Assignment. I agree when requested, without additional consideration, but at the expense of the Assignee, to provide additional reasonable assistance necessary to memorialize this assignment, to execute all oaths, declarations, assignments, powers of attorney and other papers necessary to perfect and vest title to the rights assigned herein to the Assignee.

I shall render all assistance in filing, obtaining, maintaining, and enforcing any patent (or similar legal protection) on the invention in any and all countries.

DECLARATION

I have reviewed and understand the contents of the above-identified patent application including the claims, and I believe I am an original or an original joint inventor of a claimed invention in the above-identified patent application. The above-identified patent application was made or authorized to be made by me. I am aware of and acknowledge my duty to disclose to the USPTO all information known to me

Petitioner Therabody Ex-1004, 0800

to be material to patentability of the claims in the above-identified patent application. I acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

SIGNATURES

To evidence my agreement to the ASSIGNMENT and DECLARATION set forth above, I have executed and delivered this Agreement on the date set forth below.

Signature:	/MATTHEW R. LEAPER/
Name:	Matthew Leaper
Date:	December 1, 2023
Address	1039 South 21st Street Unit #1 Omaha, NE 68108 USA

Petitioner Therabody Ex-1004, 0801

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 18/526,980

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	64		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	280		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	320		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	* 0	x =	0	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x =	0			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	664		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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Kathi Vidal

Kathi Vidal
Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office

Derrick Brent
Deputy Under Secretary of Commerce for Intellectual Property and
Deputy Director of the United States Patent and Trademark Office

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
18/526,980	12/01/2023		664	DF-P01-US08	20	3

CONFIRMATION NO. 2825

FILING RECEIPT

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

Date Mailed: 12/14/2023

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Matthew Robert Leaper, Omaha, NE;

Applicant(s)

Matthew Robert Leaper, Omaha, NE;

Assignment For Published Patent Application

DATAFEEL INC., WASHINGTON, DC

Power of Attorney: None

Domestic Applications for which benefit is claimed - None.

A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Petitioner Therabody Ex-1004, 0804

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/13/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/526,980**

Projected Publication Date: 06/05/2025

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

Petitioner Therabody Ex-1004, 0805

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LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/526,980	12/01/2023	Matthew Robert Leaper	DF-P01-US08

CONFIRMATION NO. 2825

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

IMPROPER CFR REQUEST

OC000000065771137

Date Mailed: 12/14/2023

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- One or more of the benefit claims under 35 U.S.C. § 120 cannot be included on the Filing Receipt since applicant did not specify whether the application is a continuation, divisional or continuation-in-part of the prior application. Applicant must submit a new application data sheet (ADS) that sets forth the relationship, and the ADS must be accompanied by a petition under 37 CFR 1.78 if filed after the time period set forth in 37 CFR 1.78.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/bcao/

Petitioner Therabody Ex-1004, 0808

PATENT
Customer No.: 158475
Attorney Docket No.: DF-P01-US08

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re 1.53(b) Continuation Application of U.S. Patent Application No. 18/388,489:	)	Art Unit: Not Yet Assigned
MATTHEW R. LEAPER	)	Examiner: Not Yet Assigned
Application No.: 18/526,980	)	Confirmation No.: 2825
Filed: December 1, 2023	)	
For: COMMUNICATION DEVICES, METHODS, AND SYSTEMS	)	**VIA EFS WEB**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

RESPONSE TO RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

In accordance with 37 CFR § 1.78(a)(3) and (4), Applicant respectfully submits a corrected Application Data Sheet (ADS) confirming that this application is a §1.53(b) continuation of pending prior U.S. Patent Application No. 18/388,489, filed November 9, 2023, which is a continuation of U.S. Patent Application No. 18/143,142, filed May 4, 2023, which is a continuation of U.S. Patent Application 18/092,398, filed January 2, 2023, now U.S. Patent No. 11,684,313, which is a continuation of U.S. Patent Application No. 17/213,117, filed March 25, 2021, now U.S. Patent No. 11,589,816, which is a continuation of U.S. Patent Application No. 16/757,482, filed April 20, 2020, now U.S. Patent No. 10,959,674, which is a § 371 National Stage Entry of International Patent Application No. PCT/US18/56814, filed October 22, 2018, claiming the benefit of priority of U.S. Provisional Patent Application No. 62/676,949, filed May 26, 2018, and U.S. Provisional Patent Application No. 62/575,951, filed October 23, 2017, the entireties of which are incorporated by reference into the enclosed application.

Petitioner Therabody Ex-1004, 0809

Because the corrected ADS is submitted within four months of the filing date, Applicant believes a petition is not required to make the requested change.

A corrected filing receipt is requested indicating the amendments made to the priority information by the corrected ADS.

If there is any fee due in connection with the filing of this application that is not otherwise provided with this filing, please charge the fee to Deposit Account No. **603446**. In addition, the Commissioner is hereby authorized to, now and throughout prosecution of this application, charge any additional required fees, including any fees due under 37 CFR §1.16 OR §1.17, charge any underpayments, or credit any overpayment to Deposit Account No. **603446**.

Please address all correspondence with respect to this application to: **DATAFEEL INC., Customer Number 158475**.

Respectfully submitted,

MATTHEW LEAPER
REGISTERED PATENT ATTORNEY
CEO, DATAFEEL INC.

Dated: **18DEC2023**

By: **/MATTHEW R. LEAPER/**
Matthew R. Leaper
Reg. No. 73,966
(626) 532-7371

Petitioner Therabody Ex-1004, 0810

UNITED STATES
PATENT AND TRADEMARK OFFICE

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/526,980	**12/18/2023 11:28:39 AM Z ET**	**DF-P01-US08**

Title of Invention

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2825	FILED BY	Megan Presnail
PATENT CENTER #	63612502	FILING DATE	12/01/2023
CUSTOMER #	158475	FIRST NAMED INVENTOR	Matthew Robert Leaper
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Leaper

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
CorrectedADS.pdf	4	Application Data Sheet to update/correct info	112 KB
DF-P01-US08_TL_ADS_CORRECTION.pdf	2	Transmittal Letter	83 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
CorrectedADS.pdf	6D963D4ABA44CAC47175D2711280B769D7105CAF6709B6D9E

	34C846F916AC7A8691662183428477 4F749CB4804C5FEA378166493E6383505077D1F4BA4E316A0
DF-P01-US08_TL_ADS_CORRECTION.pdf	CC981EB05E9654E8214EA40433FADA76D586AC27CAF262203F2086EBC394C16C7A6FD15B5DC5AF76827E0F398B1B2D4BDE9CF2C8FC25F8D74E9776EB9583C1C0

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

Corrected Application Data Sheet

18526980 : COMMUNICATION DEVICES, METHODS, AND SYSTEMS

~~Strike through~~ indicates removal of data from existing record Underline indicates new data being added to the application If no data is shown, no data has been corrected

Inventor Information

Data of record	Updated Data
No data change in this section	

Application Information

Title of Invention	COMMUNICATION DEVICES, METHODS, AND SYSTEMS
Attorney Docket Number	DF-P01-US08
Entity Status	Small

Domestic Benefit/National Stage Information

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c), 386(c), or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

	Updated Data

Data of record

Prior app status	PENDING
Application number	18526980
Continuity type	Continuation of
Prior app number	18388489
Filing Date	11/9/2023

Prior app status	PATENTED
Application number	18143142
Continuity type	Continuation of
Prior app number	18092398
Filing Date	01/2/2023
Patent number	11684313
Issue date	null

Prior app status	PATENTED
Application number	18092398
Continuity type	Continuation of
Prior app number	17213117
Filing Date	03/25/2021
Patent number	11589816
Issue date	null

Prior app status	PATENTED
Application number	16757482
Continuity type	A 371 of International
Prior app number	PCT/US18/56814
Filing Date	10/22/2018
Patent number	null
Issue date	null

Prior app status	PENDING
Application number	18388489
Continuity type	Continuation of
Prior app number	18143142

Filing Date	05/4/2023

Prior app status	PATENTED
Application number	17213117
Continuity type	Continuation of
Prior app number	16757482
Filing Date	04/20/2020
Patent number	10959674
Issue date	null

Prior app status	EXPIRED
Application number	PCT/US18/56814
Continuity type	Claims benefit of provisional
Prior app number	62676949
Filing Date	05/26/2018

Prior app status	EXPIRED
Application number	PCT/US18/56814
Continuity type	Claims benefit of provisional
Prior app number	62575951
Filing Date	10/23/2017

Foreign Priority Information

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the Application Data Sheet constitutes the claim for priority as required by 35 U.S.C. 119 (b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Data of record	Updated Data
No data change in this section	

Applicant Information

The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46.

Data of record	Updated Data
No data change in this section	

Assignee Information including Non-Applicant Assignee Information

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Data of record	Updated Data
No data change in this section	

Signature

NOTE:

This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b).

This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.

See CFR 1.4(d) for the manner of making signatures and certifications.

Signature	First name	Last name	Registration #	Date
/MATTHEW LEAPER/	Matthew	Leaper	73966	12/18/2023

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
18/526,980	12/01/2023		664	DF-P01-US08	20	3

CONFIRMATION NO. 2825

CORRECTED FILING RECEIPT

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

OC00000006608800 6

Date Mailed: 12/20/2023

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Matthew Robert Leaper, Omaha, NE;

Applicant(s)

Matthew Robert Leaper, Omaha, NE;

Assignment For Published Patent Application

DATAFEEL INC., WASHINGTON, DC

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 18/388,489 11/09/2023
which is a CON of 18/143,142 05/04/2023

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Petitioner Therabody Ex-1004, 0817

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/13/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/526,980**

Projected Publication Date: 06/05/2025

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

Petitioner Therabody Ex-1004, 0818

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

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technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Petitioner Therabody Ex-1004, 0820

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/526,980	12/01/2023	Matthew Robert Leaper	DF-P01-US08

CONFIRMATION NO. 2825

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

IMPROPER CFR REQUEST

OC000000066088271

Date Mailed: 12/20/2023

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

Improper Benefit Claim(s) to Prior-Filed Nonprovisional Application(s)

The benefit claim(s) to prior-filed nonprovisional application(s) is improper because there is no specific reference for each prior-filed application that includes: (1) the identification of the prior-filed application by application number, or international application number and international filing date; and (2) a clear indication of the relationship (i.e. continuation, divisional, or continuation-in-part) of the nonprovisional applications. Applicant must submit a corrected application data sheet (ADS) to include a specific reference. Applicant should review each benefit claim submitted and, if appropriate, provide the proper reference to the prior-filed application(s) as required by 37 CFR 1.78. A proper relationship includes an identification of each nonprovisional application as a continuation, divisional, or continuation-in-part application of the immediate prior-filed nonprovisional application for which a benefit is claimed under 37 CFR 1.78 in order to establish copendency throughout the entire chain of prior-filed applications. The specific reference must be included in the domestic benefit information section of an application data sheet (37 CFR 1.76).

Timeliness: The required reference for each benefit claim must be filed during the pendency of the instant application and within the later of: (1) four months from the actual filing date of the instant application, or the national stage commencement date if the instant application is a national stage application under 35 U.S.C. 371; or (2) sixteen months from the filing date of the prior-filed application. Failure to timely file the required reference is considered a waiver of any benefit claim, unless a grantable petition to accept an unintentionally delayed claim under 37 CFR 1.78(e), the petition fee set forth in 37 CFR 1.17(m), and the required reference are filed. See 37 CFR 1.78(d) and (e). Note that in design applications the required reference only needs to be filed during the pendency of the application in order to be timely. See 37 CFR 1.78(d)(3).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

Petitioner Therabody Ex-1004, 0821

/hsarwari/

Petitioner Therabody Ex-1004, 0822

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Corrected Application Data Sheet

18526980 : COMMUNICATION DEVICES, METHODS, AND SYSTEMS

~~Strike through~~ indicates removal of data from existing record Underline indicates new data being added to the application If no data is shown, no data has been corrected

Inventor Information

Data of record	Updated Data
No data change in this section	

Application Information

Title of Invention	COMMUNICATION DEVICES, METHODS, AND SYSTEMS
Attorney Docket Number	DF-P01-US08
Entity Status	Small

Domestic Benefit/National Stage Information

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c), 386(c), or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

	Updated Data

Data of record

Prior app status	PENDING
Application number	18526980
Continuity type	Continuation of
Prior app number	18388489
Filing Date	11/9/2023

Prior app status	PATENTED
Application number	18388489
Continuity type	Continuation of
Prior app number	18143142
Filing Date	05/4/2023
Patent number	11864914
Issue date	01/9/2024

Prior app status	PATENTED
Application number	18143142
Continuity type	Continuation of
Prior app number	18092398
Filing Date	01/2/2023
Patent number	11684313
Issue date	06/27/2023

Prior app status	PATENTED
Application number	18092398
Continuity type	Continuation of
Prior app number	17213117
Filing Date	03/25/2021
Patent number	11589816
Issue date	02/28/2023

Prior app status	PATENTED
Application number	17213117
Continuity type	Continuation of
Prior app number	16757482

Filing Date	04/20/2020
Patent number	10959674
Issue date	03/30/2021

Prior app status	EXPIRED
Application number	16757482
Continuity type	A 371 of international
Prior app number	PCT/US18/56814
Filing Date	10/22/2018

Prior app status	EXPIRED
Application number	PCT/US18/56814
Continuity type	Claims benefit of provisional
Prior app number	62676949
Filing Date	05/26/2018

Prior app status	EXPIRED
Application number	PCT/US18/56814
Continuity type	Claims benefit of provisional
Prior app number	62575951
Filing Date	10/23/2017

Foreign Priority Information

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the Application Data Sheet constitutes the claim for priority as required by 35 U.S.C. 119 (b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Data of record	Updated Data
No data change in this section	

Applicant Information

The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46.

Data of record	Updated Data
No data change in this section	

Assignee Information including Non-Applicant Assignee Information

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Data of record	Updated Data
No data change in this section	

Signature

NOTE:

This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b).

This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.

See CFR 1.4(d) for the manner of making signatures and certifications.

Signature	First name	Last name	Registration #	Date
/MATTHEW R. LEAPER/	Matthew	Leaper	73966	12/21/2023

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/526,980	**12/21/2023 08:20:53 PM Z ET**	**DF-P01-US08**

Title of Invention

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2825	FILED BY	Megan Presnail
PATENT CENTER #	63712890	FILING DATE	12/01/2023
CUSTOMER #	158475	FIRST NAMED INVENTOR	Matthew Robert Leaper
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Leaper

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
CorrectedADS.pdf	4	Application Data Sheet to update/correct info	110 KB
DF-P01-US08_ADS_CORRECTION_UPDATED_21DEC2023.pdf	2	Transmittal Letter	83 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
CorrectedADS.pdf	294B889143E6DAFBFD3D20806207018C32AEF615A4D9167B96

	323B31B59A12D68B5E870245490D2CB3BB4BC11E2C78F6F5 80F6294FAA6549D4853C76B34F387
DF-P01- US08_ADS_CORRECTION_UP DATED_21DEC2023.pdf	E490F848F99C227278E2215661CCE2402A4CD2F38E73DC3860 28884EDE13496EE0A77E987F05D748C168C7331E440204CC4 BA6F41836CE0F97F1800A5C59A281

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT
Customer No.: 158475
Attorney Docket No.: DF-P01-US08

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re 1.53(b) Continuation Application of U.S. Patent Application No. 18/388,489:	)	Art Unit: Not Yet Assigned
MATTHEW R. LEAPER	)	Examiner: Not Yet Assigned
Application No.: 18/526,980	)	Confirmation No.: 2825
Filed: December 1, 2023	)	
For: COMMUNICATION DEVICES, METHODS, AND SYSTEMS	)	**VIA EFS WEB**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

RESPONSE TO RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

In accordance with 37 CFR § 1.78(a)(3) and (4), Applicant respectfully submits a corrected Application Data Sheet (ADS) confirming that this application is a §1.53(b) continuation of pending prior U.S. Patent Application No. 18/388,489, filed November 9, 2023, which is a continuation of U.S. Patent Application No. 18/143,142, filed May 4, 2023, which is a continuation of U.S. Patent Application 18/092,398, filed January 2, 2023, now U.S. Patent No. 11,684,313, which is a continuation of U.S. Patent Application No. 17/213,117, filed March 25, 2021, now U.S. Patent No. 11,589,816, which is a continuation of U.S. Patent Application No. 16/757,482, filed April 20, 2020, now U.S. Patent No. 10,959,674, which is a § 371 National Stage Entry of International Patent Application No. PCT/US18/56814, filed October 22, 2018, claiming the benefit of priority of U.S. Provisional Patent Application No. 62/676,949, filed May 26, 2018, and U.S. Provisional Patent Application No. 62/575,951, filed October 23, 2017, the entireties of which are incorporated by reference into the enclosed application.

Petitioner Therabody Ex-1004, 0829

Because the corrected ADS is submitted within four months of the filing date, Applicant believes a petition is not required to make the requested change.

A corrected filing receipt is requested indicating the amendments made to the priority information by the corrected ADS.

This correction and Applicant's previous correction are responsive to unintentional errors caused by their unfamiliarity with the new Patent Center interface.

If there is any fee due in connection with the filing of this application that is not otherwise provided with this filing, please charge the fee to Deposit Account No. **603446**. In addition, the Commissioner is hereby authorized to, now and throughout prosecution of this application, charge any additional required fees, including any fees due under 37 CFR §1.16 OR §1.17, charge any underpayments, or credit any overpayment to Deposit Account No. **603446**.

Please address all correspondence with respect to this application to: **DATAFEEL INC., Customer Number 158475**.

Respectfully submitted,

MATTHEW LEAPER
REGISTERED PATENT ATTORNEY
CEO, DATAFEEL INC.

Dated: **21DEC2023**

By: **/MATTHEW R. LEAPER/**
Matthew R. Leaper
Reg. No. 73,966
(626) 532-7371

Petitioner Therabody Ex-1004, 0830

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
18/526,980	12/01/2023		664	DF-P01-US08	20	3

CONFIRMATION NO. 2825

REPLACEMENT FILING RECEIPT

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

OC000000066247126

Date Mailed: 12/27/2023

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Matthew Robert Leaper, Omaha, NE;

Applicant(s)

Matthew Robert Leaper, Omaha, NE;

Assignment For Published Patent Application

DATAFEEL INC., WASHINGTON, DC

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 18/388,489 11/09/2023
which is a CON of 18/143,142 05/04/2023 PAT 11,864,914
which is a CON of 18/092,398 01/02/2023 PAT 11,684,313
which is a CON of 17/213,117 03/25/2021 PAT 11,589,816
which is a CON of 16/757,482 04/20/2020 PAT 10,959,674
which is a 371 of PCT/US18/56814 10/22/2018
which claims benefit of 62/676,949 05/26/2018
and claims benefit of 62/575,951 10/23/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Petitioner Therabody Ex-1004, 0831

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/13/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/526,980**

Projected Publication Date: 06/05/2025

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

Petitioner Therabody Ex-1004, 0832

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

Petitioner Therabody Ex-1004, 0833

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Petitioner Therabody Ex-1004, 0834

PATENT
Customer No.: 158475
Attorney Docket No.: DF-P01-US08

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	Art Unit: Not Yet Assigned
MATTHEW R. LEAPER	)	
	)	Examiner: Not Yet Assigned
Application No.: 18/526,980	)	
Filed: December 1, 2023	)	Confirmation No.: 2825
For: COMMUNICATION DEVICES, METHODS, AND SYSTEMS	)	**VIA EFS WEB**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

SUBMISSION OF POWER OF ATTORNEY, REQUEST TO CORRECT OR UPDATE THE NAME OF THE APPLICANT, AND REQUEST FOR CORRECTED FILING RECEIPT

Pursuant to 37 CFR § 1.46(c)(2), Applicant requests that the Applicant of the above-referenced application be changed to "DATAFEEL INC." The following documents are electronically submitted herewith:

- A request to correct or update the name of the Applicant (PTO/AIA/41).
- A corrected application data sheet (or "Corrected ADS") in accordance with 37 CFR 1.76(c) and uploaded through the "Applicant Information" section of the Corrected Application Data Sheet section of the Patent Center interface.
- A Statement Under 37 CFR 3.73(c) (PTO/AIA/96).

Petitioner Therabody Ex-1004, 0835

- An executed Power of Attorney (PTO/AIA/80).

The Corrected ADS was uploaded via the "Applicant Information" section of the Corrected Application Data Sheet section of the Patent Center interface.

Applicant further requests a correct filing receipt to show these changes and others relation to this application. A marked-up copy of the official filing receipt mailed December 27, 2023, is electronically submitted herewith to show the requested changes, including appropriate corrections for changing the Applicant and naming the recorded Assignee.

Applicant does not believe that any fees are due. Nonetheless, if there is any fee due in connection with the filing of this application that is not otherwise provided, please charge the fee to Deposit Account No. **603446**. In addition, the Commissioner is hereby authorized to, now and throughout prosecution of this application, charge any additional required fees, including any fees due under 37 CFR §1.16 OR §1.17, charge any underpayments, or credit any overpayment to Deposit Account No. **603446**.

Please address all correspondence with respect to this application to: **Matthew Leaper, Customer Number 179524**.

Respectfully submitted,

MATTHEW LEAPER
REGISTERED PATENT ATTORNEY

Dated: **07JAN2024**

By: **/MATTHEW LEAPER/**
Matthew Leaper
Reg. No. 73,966
(626) 532-7371

Petitioner Therabody Ex-1004, 0836

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/526,980	**01/08/2024 01:05:00 AM Z ET**	**DF-P01-US08**

Title of Invention

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2825	FILED BY	Megan Presnail
PATENT CENTER #	63830343	FILING DATE	12/01/2023
CUSTOMER #	158475	FIRST NAMED INVENTOR	Matthew Robert Leaper
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Leaper

Documents

TOTAL DOCUMENTS: 6

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
CorrectedADS.pdf	3	Application Data Sheet to update/correct info	66 KB
DF_P01-US08_CoA_TL.pdf	2	Transmittal Letter	90 KB
DF_P01_US08_aia0096.pdf	3	Assignee showing of ownership per 37 CFR 3.73	115 KB
DF_P01-US08_MARKED-UP_FILING_RECEIPT.pdf	4	Request for Corrected Filing Receipt	390 KB

Warning: The attached file contains comments or annotations. Comments are not recommended and may cause processing problems with the document.

DF_P01_US08_aia0080.pdf	2	Miscellaneous Incoming Letter	496 KB
DF_P01_US08_aia0041.pdf	2	Miscellaneous Incoming Letter	319 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
CorrectedADS.pdf	744F316D614A16DACA64E8AD62F72BC97EAE53A0548F870F724CBCF468521E2980D857D1E471CEB6811813B9BE0B39C60B610D58EDDD811B988A98B3939F7F59
DF_P01-US08_CoA_TL.pdf	C509AF599189FAD97EA3CA99F051FEE722A655F72CA496ACB7E0C7F4C993BC33685FE32B5E6BC1DB878699495E174397CF195C3303B309C56D8C469562B4BD06
DF_P01_US08_aia0096.pdf	200C7AF15B8B14685A4823D941F3A0818F0A0E6FAF7A20A45FDEFF2D753A4068795B61119E59314C25FB2BB6B2C1DED1D0894CB5D50FC13A91AB99B58679F27B
DF_P01-US08_MARKED-UP_FILING_RECEIPT.pdf	D5F1A394122837D108273AE7E169E9D384FCFCCB639CE4B1F539DA787A1C2CD1F4E0FE7BB1240608600A28CD014FDE11C01E278AA1B50E1111F54E6058506738
DF_P01_US08_aia0080.pdf	C86FF9F2A69774660EDE6A38B0A588D109622E7A478AFD1720AC5DF6847B5FCABD8A6405FF7C34B6C52127BA12C87E75586FC525F3CA6102DE3CBA892D913323
DF_P01_US08_aia0041.pdf	1B359A81D820F1B3D354A52C47613DEC79BC100381F91D08128BF5752685F184A5C3DD1634F894534D25ADC0240B9CE3D3CDB600D993A46515A14EED06CFA458

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement

Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

Corrected Application Data Sheet

18526980 : COMMUNICATION DEVICES, METHODS, AND SYSTEMS

~~Strike through~~ indicates removal of data from existing record Underline indicates new data being added to the application If no data is shown, no data has been corrected

Inventor Information

Data of record	Updated Data

No data change in this section

Application Information

Title of Invention	COMMUNICATION DEVICES, METHODS, AND SYSTEMS
Attorney Docket Number	DF-P01-US08
Entity Status	Small

Domestic Benefit/National Stage Information

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c), 386(c), or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

	Updated Data

Data of record

No data change in this section

Foreign Priority Information

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the Application Data Sheet constitutes the claim for priority as required by 35 U.S.C. 119 (b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Data of record	Updated Data

No data change in this section

Applicant Information

The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46.

Data of record	Updated Data
	DATAFEEL INC. 1629 K STREET NW SUITE 300 WASHINGTON, DC 20006 UNITED STATES Phone : ---- Email : ---- Fax : ---- Organization Applicant type : Assignee

Assignee Information including Non-Applicant Assignee Information

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Data of record	Updated Data
No data change in this section	

Signature

NOTE:

This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b).

This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.

See CFR 1.4(d) for the manner of making signatures and certifications.

Signature	First name	Last name	Registration #	Date
/MATTHEW LEAPER/	Matthew	Leaper	73966	01/08/2024

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and TrademarkOffice; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork ReductionAct of 1995, no personsare required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Matthew Robert Leaper

Application No./Patent No.: 18/526,980 Filed/Issue Date: 12/01/2023

Titled: COMMUNICATION DEVICES, METHODS, AND SYSTEMS

DATAFEEL INC., a Delaware Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 065742, Frame 0255, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

   The document was recorded in the United States Patent and Trademark Office at

   Reel _____, Frame _____, or for which a copy thereof is attached.

This collectionof information is required by 37CFR 3.73(b). The informationis required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application.Confidentiality isgoverned by 35U.S.C. 122 and37 CFR 1.11and 1.14.This collection is estimated to take 12 minutes to complete, including gathering,preparing, and submitting the completed applicationform to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should besent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETEDFORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA22313-1450** .

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/MATTHEW R. LEAPER/	January 7, 2024
Signature	Date
Matthew Robert Leaper	73,966
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requiresthat you begiven certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirementsof the Act, please be advised that: (1)the general authority for the collectionof this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary;and (3) the principalpurpose for whichthe informationis used by the U.S. Patent and Trademark Office is to process and/or examine your submission related toa patent application or patent. If you do not furnishthe requested information, the U.S. Patent and Trademark Officemay not be able to process and/or examine yoursubmission, which may result in termination of proceedings orabandonment of the application or expiration of the patent.

Theinformation provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need forthe information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. Arecord related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further,a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. Arecord from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
18/526,980	12/01/2023		664	DF-P01-US08	20	3

CONFIRMATION NO. 2825

REPLACEMENT FILING RECEIPT

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

OC00000006624712

Date Mailed: 12/27/2023

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

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Inventor(s)

Matthew Robert Leaper, Omaha, NE;

Applicant(s)

~~Matthew Robert Leaper, Omaha, NE;~~DATAFEEL INC., WASHINGTON, DC

Assignment For Published Patent Application

DATAFEEL INC., WASHINGTON, DC

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 18/388,489 11/09/2023
which is a CON of 18/143,142 05/04/2023 PAT 11,864,914
which is a CON of 18/092,398 01/02/2023 PAT 11,684,313
which is a CON of 17/213,117 03/25/2021 PAT 11,589,816
which is a CON of 16/757,482 04/20/2020 PAT 10,959,674
which is a 371 of PCT/US18/56814 10/22/2018
which claims benefit of 62/676,949 05/26/2018
and claims benefit of 62/575,951 10/23/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Petitioner Therabody Ex-1004, 0846

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/13/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/526,980**

Projected Publication Date: 06/05/2025

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

Petitioner Therabody Ex-1004, 0847

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

Petitioner Therabody Ex-1004, 0848

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Petitioner Therabody Ex-1004, 0849

Doc Code: R46C.REQ
Document Description: Request under 37 CFR 1.46(c) to correct, update or change the applicant.

PTO/AIA/41 (04-15)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST TO CORRECT OR UPDATE THE NAME OF THE APPLICANT UNDER 37 CFR 1.46(c)(1), OR CHANGE THE APPLICANT UNDER 37 CFR 1.46(c)(2)
(FOR USE ONLY IN APPLICATIONS FILED ON OR AFTER SEPTEMBER 16, 2012)

Application Number	18/526,980
Filing Date	12/01/2023
First Named Inventor	Matthew Robert Leaper
Art Unit	Not Yet Assigned
Examiner Name	Not Yet Assigned
Practitioner Docket Number	DF-P01-US08

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant hereby **requests that the name of the applicant be corrected or updated under 37 CFR 1.46(c)(1), or that the applicant be changed under 37 CFR 1.46(c)(2),** in the above-identified application. **Requests under 37 CFR 1.46(c)(1) or (c)(2) cannot be submitted after payment of the issue fee or if the application has been patented.**

Please check the applicable box(es) below.

☐ 1. This request is to **correct or update the name of the applicant** (**under 37 CFR 1.46(c)(1)**) and includes:

☐ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). A Corrected Web-based ADS may be used.

Note: Requests under 37 CFR 1.46(c)(1) may be filed to correct typographical errors in the name of the § 1.46 applicant, or for updating the name of the § 1.46 applicant (*i.e.*, where there is no change in the applicant itself but just in the applicant's name). See the Manual of Patent Examining Procedure (MPEP) section 605.01.

☒ 2. This request is to **change the applicant** (**under 37 CFR 1.46(c)(2)**) and includes:

☒ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) that identifies the changes with proper markings (underlining for insertions and strikethrough for deletions). A Corrected Web-based ADS may be used.

☒ A Statement Under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent). See MPEP 325.

I am the

☐ applicant* ☒ attorney or agent of record Registration number 73,966 ☐ attorney or agent acting under 37 CFR 1.34 Registration number _____

Signature /MATTHEW R. LEAPER/

Typed or printed name Matthew Robert Leaper

Date January 4, 2024

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. *Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below**.

☐ ** Total of _____ forms are submitted.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0031. Public burden for this form is estimated to average 12 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **If filing this completed form by mail, send to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013). https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to: 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law; 2) a Federal, state, local, or international agency, in response to its request; 3) a contractor of the USPTO having need for the information in order to perform a contract; 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record; 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record; 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations; 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals; 8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)); 9) the Office of Personnel Management (OPM) for personnel research purposes; and 9) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Additional Uses

Additional USPTO uses of the information in this record may include disclosure to: 1) the International Bureau of the World Intellectual Property Organization, if the record is related to an international application filed under the Patent Cooperation Treaty; 2) the public i) after publication of the application pursuant to 35 U.S.C. 122(b), ii) after issuance of a patent pursuant to 35 U.S.C. 151, iii) if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections, or an issued patent, or iv) without publication of the application or patent under the specific circumstances provided for by 37 CFR 1.14(a)(1)(v)-(vii); and/or 3) the National Archives and Records Administration, for inspection of records.

PTO/AIA/80 (07-17)
Approved for use through 09/30/2025. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 158475

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number:

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: DATAFEEL INC.
1629 K Street NW, Suite 300, Washington, DC, USA

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature /MATTHEW R. LEAPER/	Date January 7, 2024
Name Matthew Robert Leaper	Telephone 626-532-7371
Title CEO of DATAFEEL INC.	

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0035. Public burden for this form is estimated to average 18 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013). https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/526,980	12/01/2023	Matthew Robert Leaper	DF-P01-US08

CONFIRMATION NO. 2825

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

POA ACCEPTANCE LETTER

OC000000066752196

Date Mailed: 01/10/2024

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/08/2024.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/byemane/

Petitioner Therabody Ex-1004, 0854

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
18/526,980	12/01/2023	OPAP	664	DF-P01-US08	20	3

CONFIRMATION NO. 2825

REPLACEMENT FILING RECEIPT

158475
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

OC00000006752216

Date Mailed: 01/10/2024

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Matthew Robert Leaper, Omaha, NE;

Applicant(s)

DATAFEEL INC., Washington, DC;

Assignment For Published Patent Application

DATAFEEL INC., WASHINGTON, DC

Power of Attorney: The patent practitioners associated with Customer Number 158475

Domestic Priority data as claimed by applicant

This application is a CON of 18/388,489 11/09/2023
which is a CON of 18/143,142 05/04/2023 PAT 11,864,914
which is a CON of 18/092,398 01/02/2023 PAT 11,684,313
which is a CON of 17/213,117 03/25/2021 PAT 11,589,816
which is a CON of 16/757,482 04/20/2020 PAT 10,959,674
which is a 371 of PCT/US18/56814 10/22/2018
which claims benefit of 62/676,949 05/26/2018
and claims benefit of 62/575,951 10/23/2017

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Petitioner Therabody Ex-1004, 0855

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/13/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/526,980**

Projected Publication Date: 06/05/2025

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Preliminary Class

600

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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Petitioner Therabody Ex-1004, 0856

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

Petitioner Therabody Ex-1004, 0857

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Petitioner Therabody Ex-1004, 0858

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/526,980	12/01/2023	Matthew Robert Leaper	DF-P01-US08	2825

158475 7590 01/23/2024

DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

EXAMINER
CENTRAL, DOCKET

ART UNIT	PAPER NUMBER
OPAP	

NOTIFICATION DATE	DELIVERY MODE
01/23/2024	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@DATAFEEL.COM
eofficeaction@appcoll.com

Petitioner Therabody Ex-1004, 0859

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 18/526,980	**Applicant(s)** Leaper, Matthew Robert	
	Examiner FIKIRTE A GEREMEW	**Art Unit** OMBL	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 01 December 2023 IS **GRANTED** .

   The above-identified application has met the requirements for prioritized examination
   - A. ☑ for an original nonprovisional application (Track I).
   - B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination**. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:
   - A. filing a **petition for extension of time** to extend the time period for filing a reply;
   - B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;
   - C. filing a **request for continued examination** ;
   - D. filing a notice of appeal;
   - E. filing a request for suspension of action;
   - F. mailing of a notice of allowance;
   - G. mailing of a final Office action;
   - H. completion of examination as defined in 37 CFR 41.102; or
   - I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to FIKIRTE GEREMEW at (703) 756-1930. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/FIKIRTE A GEREMEW/ PROGRAM SUPPORT SPECIALIST, OMBL	

Petitioner Therabody Ex-1004, 0860

UNITED STATES
PATENT AND TRADEMARK OFFICE

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/526,980	**02/05/2024 09:34:17 PM Z ET**	**DF-P01-US08**

Title of Invention

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2825	FILED BY	Matthew Leaper
PATENT CENTER #	64217512	AUTHORIZED BY	-
CUSTOMER #	158475	FILING DATE	12/01/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Matthew Robert Leaper

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
DA / 603446	**E202425L34475104**	**Matthew Leaper**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2202	EACH CLAIM IN EXCESS OF 20	40.00	10	400.00
			TOTAL AMOUNT:	**$400.00**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage

submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/526,980	**02/05/2024 09:34:17 PM Z ET**	**DF-P01-US08**

Title of Invention

COMMUNICATION DEVICES, METHODS, AND SYSTEMS

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CONFIRMATION #	2825	FILED BY	Matthew Leaper
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CUSTOMER #	158475	FIRST NAMED INVENTOR	Matthew Robert Leaper
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
DF-P01-US08_PRELIMINARY_AMENDMENT.pdf	9	Preliminary Amendment	139 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
DF-P01-US08_PRELIMINARY_AMENDMENT.pdf	9C2C8214F64192A70561D4EE94148B70092486F875374E0449C59A49C2AD4E32B63E56ECD8ECF1634A8DE1F4F241166614E993882014FFC6FD86C17C5DFBB096

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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AMENDMENTS TO THE SPECIFICATION

Please replace the first full paragraph on page 1 of the specification of this application, following the section heading entitled "CROSS-REFERENCE TO RELATED APPLICATIONS," with the following amended paragraph:

[0001] This application is a § 1.53(b) continuation of pending prior U.S. Patent Application No. 18/388,489, filed November 9, 2023, which is a continuation of U.S. Patent Application No. 18/143,142, filed May 4, 2023, now U.S. Patent No. 11,864,914, which is a continuation of U.S. Patent Application 18/092,398, filed January 2, 2023, now U.S. Patent No. 11,684,313, which is a continuation of U.S. Patent Application No. 17/213,117, filed March 25, 2021, now U.S. Patent No. 11,589,816, which is a continuation of U.S. Patent Application No. 16/757,482, filed April 20, 2020, now U.S. Patent No. 10,959,674, which is a § 371 National Stage Entry of International Patent Application No. PCT/US18/56814, filed October 22, 2018, claiming the benefit of priority of U.S. Provisional Patent Application No. 62/676,949, filed May 26, 2018, and U.S. Provisional Patent Application No. 62/575,951, filed October 23, 2017, the entireties of which are incorporated by reference into the enclosed application.

Petitioner Therabody Ex-1004, 0865

PATENT
Customer No.: 158475
Attorney Docket No.: DF-P01-US08

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re 1.53(b) Continuation Application of U.S. Patent Application No. 18/388,489:	Art Unit: Not Yet Assigned
MATTHEW R. LEAPER	Examiner: Not Yet Assigned
Application No.: 18/526,980	Confirmation No.: 2825
Filed: December 1, 2023	
For: COMMUNICATION DEVICES, METHODS, AND SYSTEMS	**VIA EFS WEB**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

PRELIMINARY AMENDMENT

Prior to examination, please amend this application as follows:

Amendments to the Specification begin at page 2.

Amendments to the Claims begin at page 3.

Remarks follow the amendments.

Petitioner Therabody Ex-1004, 0866

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in this Application:

1. (Original) A treatment device, comprising:

a body provided with a processing unit and a power source; and

a plurality of energy generator elements being independently operable to convert electricity from the power source into a plurality of different energy types transmittable towards an area of skin of a user, the plurality of energy generator elements being arranged coaxially about an axis,

wherein the body includes a grip arranged to be grasped by a hand of the user applying a gripping force to maintain the plurality of energy generator elements on or adjacent the area of skin.

2. (Original) The treatment device of claim 1, wherein the plurality of energy generator elements includes a first energy generator element and a second energy generator element, and wherein the first energy generator element is an impact generator element that is linearly actuatable along the axis to contact the area of skin.

3. (Original) The treatment device of claim 2, wherein the impact generator element includes a drive mechanism, a piston, and tissue contacting member, wherein the drive mechanism is operably coupled to a controller that directs electricity to the drive mechanism to move the piston and along the axis.

4. (Original) The treatment device of claim 2, wherein the second energy generator element is substantially ring shaped and arranged coaxially about the first energy generator element.

5. (Original) The treatment device of claim 2, wherein the second energy generator element includes a reflecting groove circumferentially arranged about the axis, the reflecting groove defining a concave shape arranged to reflect a second energy type towards the area of skin.

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6. (Original) The treatment device of claim 1, wherein the plurality of energy generator elements includes:

a heat generator element;

an impact generator element; and/or

a pressure generator element.

7. (Original) The treatment device of claim 1, wherein the plurality of different energy types includes:

a heat flux directed toward the area of skin;

an impact force applied to the area of skin; and/or

a pressure force applied to the area of skin.

8. (Original) The treatment device of claim 1, wherein at least one of the plurality of energy generator elements is contained within a housing that is removably securable to the body.

9. (Original) A treatment device, comprising:

a body provided with a sensor, a power source, and a processing unit configured to receive input data and generate a control signal based on the input data, the body further including a skin contacting surface maintainable against skin of a user by a force applied by a hand of a user when gripping the body; and

a first energy generator element and a second energy generator element coupled to the body, the first and second energy generator elements being independently operable to convert electricity from the power source into a first energy type and a second energy type, respectively, and direct the first and second energy types toward an area of skin, the first energy generator element including an impact generator element that is linearly actuatable along an axis to output an impact force against the area of skin,

wherein the sensor is configured to detect additional input data based on a vital sign of the user and transmit the input data for display.

10. (Original) The treatment device of claim 9, wherein the additional input data corresponds to a heart rate of the user.

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11. (Original) The treatment device of claim 9, further comprising a controller configured to modify intensity of the first energy type and the second energy type.

12. (Original) The treatment device of claim 9, wherein a portion of the body configured to be gripped by the hand of the user is configured to emulate a grip of a gun.

13. (Original) The treatment device of claim 9, wherein the impact generator element includes a drive mechanism, a piston, and a tissue contacting member, wherein the drive mechanism is operably coupled to a controller to direct electricity to the drive mechanism and move the piston along the axis.

14. (Original) The treatment device of claim 9, wherein the second energy generator element is a heat generator element configured to output a second energy type including a heat flux toward the area of skin.

15. (Original) The treatment device of claim 14, wherein the heat generator element is arranged coaxially about the axis.

16. (Original) The treatment device of claim 14, further comprising a third energy generator element independently operable of the first and second energy generator elements to output a third energy type toward the area of skin.

17. (Original) The treatment device of claim 16, further comprising a controller configured to modify an intensity of the first, second, and third energy types.

18. (Original) A treatment device, comprising:

a body provided with a power source and a processing unit configured to receive input data and generate a control signal based on the input data, the body including a skin contacting surface maintainable against skin of a user by a force applied by a hand of the user when gripping the body; and

a first energy generator element and a second energy generator element coupled to the body, the first and second energy generator elements being independently operable to convert electricity from the power source into a first energy type and a second energy type, respectively, and direct the first

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and second energy types toward an area of skin, the first energy generator element including an impact generator element that is linearly actuatable along an axis to output the first energy type including an impact force against the area of skin;

wherein the processing unit is operable to output an optical signal on a display that is observable by eyes of the user, the output corresponding to the control signal.

19. (Original) The treatment device of claim 18, wherein a portion of the body configured to be gripped by the hand of the user is configured to emulate a grip of a gun.

20. (Original) The treatment device of claim 18, further comprising a sensor to detect additional input data based on a vital sign of the user, the additional input data corresponding to heart rate of the user.

21. (New) A treatment method, comprising:

maintaining a skin contacting surface of a body against an area of skin of a user by gripping the body with a hand and applying a gripping force with the hand, the body comprising a plurality of energy generator elements that are independently operable to output a plurality of different energy types toward the area of skin; and

causing, with a processing unit and a power source, while maintaining the skin contact surface against the skin with the gripping force, the plurality of energy generator elements to convert electricity from the power source into the plurality of different energy types by independently or simultaneously causing:

a first generator element that is linearly actuatable along an axis to output a first energy type to the area of skin; and

a second generator element that is arranged coaxially about the first energy generator element along the axis to output a second energy type to the area of skin.

22. (New) The method of claim 21, comprising independently or simultaneously causing, with the processing unit:

the first energy type to stimulate touch receptors associated with the area of skin; and

the second energy type to stimulate thermal receptors associated with the area of skin.

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23. (New) The method of claim 21, wherein the first energy type comprises an impact force and causing the first generator element to output the first energy type comprises:

causing, with the processing unit, a drive mechanism to move a piston linearly along the axis so that a tissue contacting member attached to the piston communicates the first energy type by applying an impact force the area of skin.

24. (New) The method of claim 21, wherein the first energy type comprises a pressure force and causing the first generator element to output the first energy type comprises:

causing, with the controller, a transducer to move a membrane linearly along the axis so that a surface area of the membrane communicates the first energy type by applying a pressure force to the area of skin.

25. (New) The method of claim 21, wherein causing the second generator element to output the second energy type comprises:

directing the second energy type along the axis with an annular surface that is arranged coaxially about the first energy generator element.

26. (New) The method of claim 21, wherein the second energy type comprises a heat flux and causing the second generator element to output the second energy type comprises:

causing, with the controller, an electrical resistor to output the heat flux; and

directing the heat flux toward the area of skin.

27. (New) The method of claim 21, comprising

receiving, with the processing unit, input data from a data source;

generating, with the processing unit, a control signal based on the input data; and

causing, with the processing unit, the plurality of energy generator elements to output the plurality of different energy types responsive to the control signal.

28. (New) The method of claim 27, comprising:

detecting, with a sensor, additional input data based on a vital sign of the user; and

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transmitting, with the sensor, the additional input data to processing unit.

29. (New) The method of claim 28, comprising:

modifying, with the processing unit, an intensity of the first energy type or the second energy type responsive to the input data or the additional input data.

30. (New) The method of claim 21, comprising independently or simultaneously causing a third generator element that is arranged coaxially about the first energy generator element and the second generator element along the axis to output a third energy type to the area of skin.

Petitioner Therabody Ex-1004, 0872

REMARKS

By this Preliminary Amendment, Applicant has (i) amended the specification of this application to insert the required reference to the parent applications to which this application claims the benefit of priority; and (ii) added new claims 21-30. The originally filed specification and drawings fully support this Preliminary Amendment. No new matter is added. A total of thirty (30) claims with four (4) independent claims are now pending.

This application claims the benefit of earlier filed patent applications. To the extent that the claims in this application have the same or similar terms to those of the parent application, Applicant hereby rescinds any disclaimers originating from arguments made during prosecution of the parent applications, if any. Applicant invites the Examiner to revisit the relevant prior art of the parent applications. Hakim v. Cannon Avent Group, 479 F.3d 1313 (Fed. Cir. 2007).

If there is any fee due in connection with the filing of this application that is not otherwise provided, please charge the fee to Deposit Account No. **603446**. In addition, the Commissioner is hereby authorized to, now and throughout prosecution of this application, to charge any additional required fees, including any fees due under 37 CFR §1.16 OR §1.17, charge any underpayments, or credit any overpayment to Deposit Account No. **603446**.

Please address all correspondence with respect to this application to: **DATAFEEL INC., customer number 158475.**

Respectfully submitted,

MATTHEW LEAPER
REGISTERED PATENT ATTORNEY
CEO, DATAFEEL INC.

Dated: **05FEB2024**

By: **/MATTHEW R. LEAPER/**
Matthew R. Leaper
Reg. No. 73,966
(626) 532-7371

Petitioner Therabody Ex-1004, 0873

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/526,980	Leaper, Matthew Robert
	Examiner	Art Unit
	MARK R GAWORECKI	2884

CPC - Searched*		
Symbol	**Date**	**Examiner**
A61B 5/0022, 1112, 1114, 318, 4029, 4824, 4836, 4848, 486, 6803, 6807, 681, 6824, 6833, 7435, 2503/12, 2560/0214, 0412, 0468, 2562/046, 164	02/05/2024	MG
A61N 1/0456, 0484, 0492, 36014, 3603	02/05/2024	MG
G06F 3/016	02/05/2024	MG
A61H 23/006, 02, 2201/0153, 0207, 123, 1664, 2205/065, 2230/065	02/05/2024	MG

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

/MARK R GAWORECKI/ Primary Examiner, Art Unit 2884	

Petitioner Therabody Ex-1004, 0874

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/526,980	Leaper, Matthew Robert
	Examiner	Art Unit
	MARK R GAWORECKI	2884

Search Notes		
Search Notes	**Date**	**Examiner**
A61B 5/0022, 1112, 1114, 318, 4029, 4824, 4836, 4848, 486, 6803, 6807, 681, 6824, 6833, 7435, 2503/12, 2560/0214, 0412, 0468, 2562 /046, 164	02/05/2024	MG
A61N 1/0456, 0484, 0492, 36014, 3603	02/05/2024	MG
G06F 3/016	02/05/2024	MG
A61H 23/006, 02, 2201/0153, 0207, 123, 1664, 2205/065, 2230/065	02/05/2024	MG
Classification text narrowed: communicat$3 near3 nerv$1, communicat$3 with nerve$1, output$4 with skin with energ$3, output $4 with skin with energy, output$5 with skin, tissue with interface, energ$3 with (skin nerve bone muscle)	02/05/2024	MG
Inventor/assignee search (SEARCH)	02/05/2024	MG
Reviewed search for parent applications	02/05/2024	MG
SEARCH history attachment	02/05/2024	MG

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
A61B	5/0022, 1112, 1114, 318, 4029, 4824, 4836, 4848, 486, 6803, 6807, 681, 6824, 6833, 7435, 2503/12, 2560/0214, 0412, 0468, 2562/046, 164	02/05/2024	MG
A61N	1/0456, 0484, 0492, 36014, 3603	02/05/2024	MG
G06F	3/016	02/05/2024	MG
A61H	A61H 23/006, 02, 2201/0153, 0207, 123, 1664, 2205/065, 2230/065	02/05/2024	MG
PGPUB-Text	See SEARCH history attachment		

/MARK R GAWORECKI/ Primary Examiner, Art Unit 2884	

Petitioner Therabody Ex-1004, 0875

UNITED STATES PATENT AND TRADEMARK OFFICE

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NOTICE OF ALLOWANCE AND FEE(S) DUE

158475 7590 02/14/2024

DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

EXAMINER	
GAWORECKI, MARK R	
ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 02/14/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/526,980	12/01/2023	Matthew Robert Leaper	DF-P01-US08	2825

TITLE OF INVENTION: COMMUNICATION DEVICES, METHODS, AND SYSTEMS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	05/14/2024

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

Petitioner Therabody Ex-1004, 0876

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via the USPTO patent electronic filing system.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

158475 7590 02/14/2024
DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/526,980	12/01/2023	Matthew Robert Leaper	DF-P01-US08	2825

TITLE OF INVENTION: COMMUNICATION DEVICES, METHODS, AND SYSTEMS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	05/14/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
GAWORECKI, MARK R	2884	600-301000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via the USPTO patent electronic filing system ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (11/23) Approved for use through 03/31/2026 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Petitioner Therabody Ex-1004, 0877

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/526,980	12/01/2023	Matthew Robert Leaper	DF-P01-US08	2825

158475 7590 02/14/2024

DATAFEEL INC.
MATTHEW LEAPER, REGISTERED PATENT ATTORNEY
1629 K Street NW
SUITE 300
WASHINGTON, DC 20006

EXAMINER	
GAWORECKI, MARK R	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 02/14/2024

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 11/23)

Petitioner Therabody Ex-1004, 0878

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).
https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf

Routine uses of the information in this record may include disclosure to:

1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
2) a federal, state, local, or international agency, in response to its request;
3) a contractor of the USPTO having need for the information in order to perform a contract;
4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
8) another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c));
9) the Office of Personnel Management (OPM) for personnel research purposes; and
10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/526,980	Applicant(s) Leaper, Matthew Robert	
	Examiner MARK R GAWORECKI	Art Unit 2884	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the communication filed 1 December 2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 12/01/2023 (2).
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/MARK R GAWORECKI/
Primary Examiner, Art Unit 2884

Petitioner Therabody Ex-1004, 0880

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

2. Claims 1-20 are allowed.

3. The following is an examiner's statement of reasons for allowance:

Creasey *et al.* (US 2016/0129248 A1, cited by Applicant) discloses a treatment system (activation of nerves by topical stimulators, thus "treating" them, par. [0003]) comprising a body comprising a skin facing surface and an opposing surface ("can be placed on the skin of a human or mammal", par. [0032], and corresponding opposite surface), a plurality of energy generators (electrodes, 408, par. [0052]), wherein a processing unit is configured to communicate with nerves associated with the skin ("electronic circuits or chips that perform the functions…", par. [0052]). Creasey further discloses the use of an adhesive for attaching the device to a biological subject (par. [0057]; adhesive for adherence to skin).

With respect to claims 1, 9, and 18, Creasey does not disclose the claimed configuration including a plurality of energy generator elements being independently operable to convert electricity from the power source into a plurality of different energy types transmittable towards an area of

skin of a user in addition to a grip arranged to be grasped by a hand of the user applying a gripping force to maintain the plurality of energy generator elements on or adjacent the area of skin, as claimed.

Claims 2-8, 10-17, and 19-20 are allowable for reasons of dependency.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARK R GAWORECKI whose telephone number is (571)272-8540. The examiner can normally be reached Monday-Friday 8 AM-6 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID MAKIYA can be reached on 571-272-2273. The fax

phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MARK R GAWORECKI/
Primary Examiner, Art Unit 2884
5 February 2024

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)		
	Application Number	
	Filing Date	2023-12-01
	First Named Inventor	Matthew Robert Leaper
	Art Unit	
	Examiner Name	
	Attorney Docket Number	DF-P01-US08

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10019912	B2	2018-07-10	Eagleman et al.	Entire Document
	2	10039928	B2	2018-08-07	Hyde et al.	Entire Document
	3	10058476	B2	2018-08-28	Baxter et al.	Entire Document
	4	10070799	B2	2018-09-11	Ang et al.	Entire Document
	5	10080906	B2	2018-09-25	Schwarz et al.	Entire Document
	6	10111010	B2	2018-10-23	ALEXIOU et al.	Entire Document
	7	10123937	B2	2018-11-13	Pisharodi et al.	Entire Document
	8	10181331	B2	2019-01-15	Eagleman et al.	Entire Document

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.R.G/

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	Attorney Docket Number	DF-P01-US08

	9	10198076	B2	2019-02-05	Eagleman et al.	Entire Document
	10	10200332	B2	2019-02-05	Wu et al.	Entire Document
	11	10216278	B2	2019-02-26	Nakamura et al.	Entire Document
	12	10234934	B2	2019-03-19	Connor	Entire Document
	13	10255771	B2	2019-04-09	Baron et al.	Entire Document
	14	10275029	B2	2019-04-30	Jones et al.	Entire Document
	15	10285902	B2	2019-05-14	Pamplin et al.	Entire Document
	16	10321873	B2	2019-06-18	Connor	Entire Document
	17	10371544	B2	2019-08-06	Yoo et al.	Entire Document
	18	10384076	B2	2019-08-20	Wagenaar et al.	Entire Document
	19	10456604	B2	2019-10-29	Cheatham III et al.	Entire Document

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	20	10524978	B2	2020-01-07	Marton et al.	Entire Document
	21	10589087	B2	2020-03-17	Tyler et al.	Entire Document
	22	10625074	B2	2020-04-21	Rosenbluth et al.	Entire Document
	23	10699538	B2	2020-06-30	Novich et al.	Entire Document
	24	10748448	B2	2020-08-18	Knott et al.	Entire Document
	25	10888708	B2	2021-01-12	Stephens et al.	Entire Document
	26	10945878	B2	2021-03-16	Deng et al.	Entire Document
	27	11247039	B2	2022-02-15	Prouza et al.	Entire Document
	28	11253717	B2	2022-02-22	Schwarz et al.	Entire Document
	29	11439841	B2	2022-09-13	Zimmerman	Entire Document
	30	11464993	B2	2022-10-11	Schwarz et al.	Entire Document

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	31	11701253	B2	2023-07-18	Black et al.	Entire Document
	32	11712367	B2	2023-08-01	SIMONS et al.	Entire Document
	33	2088780	A	1937-08-03	Follese	Entire Document
	34	2327222	A	1943-08-17	Sell	Entire Document
	35	3108268	A	1963-10-22	Uttal	Entire Document
	36	3594787	A	1971-07-20	Ickes	Entire Document
	37	3848608	A	1974-11-19	Leonard	Entire Document
	38	4167189	A	1979-09-11	Tachi et al.	Entire Document
	39	4428368	A	1984-01-31	Torii	Entire Document
	40	4510939	A	1985-04-16	Brenman et al.	Entire Document
	41	4535784	A	1985-08-20	Rohlicek et al.	Entire Document

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	42	4573481	A	1986-03-04	Bullara	Entire Document
	43	4612934	A	1986-09-23	Borkan	Entire Document
	44	4628933	A	1986-12-16	Michelson	Entire Document
	45	4651716	A	1987-03-24	Forester et al.	Entire Document
	46	4676246	A	1987-06-30	Korenaga	Entire Document
	47	4837049	A	1989-06-06	Byers et al.	Entire Document
	48	4885565	A	1989-12-05	Embach	Entire Document
	49	4926879	A	1990-05-22	Sevrain et al.	Entire Document
	50	4930504	A	1990-06-05	Diamantopoulos et al.	Entire Document
	51	5385503	A	1995-01-31	Stouffer et al.	Entire Document
	52	5776233	A	1998-07-07	Wiedemann et al.	Entire Document

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	53	5024236	A	1991-06-18	Shapiro	Entire Document
	54	5050587	A	1991-09-24	Sagara et al.	Entire Document
	55	5109844	A	1992-05-05	De Juan et al.	Entire Document
	56	5150704	A	1992-09-29	Tatebayashi et al.	Entire Document
	57	5165897	A	1992-11-24	Johnson	Entire Document
	58	5175459	A	1992-12-29	Danial et al.	Entire Document
	59	5215088	A	1993-06-01	Normann et al.	Entire Document
	60	5259380	A	1993-11-09	Mendes et al.	Entire Document
	61	5272716	A	1993-12-21	Soltz et al.	Entire Document
	62	5300097	A	1994-04-05	Lerner et al.	Entire Document
	63	5304207	A	1994-04-19	Stromer	Entire Document

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	64	5327886	A	1994-07-12	Chiu	Entire Document
	65	5358503	A	1994-10-25	Bertwell et al.	Entire Document
	66	5436622	A	1995-07-25	Gutman et al.	Entire Document
	67	5449378	A	1995-09-12	Schouenborg	Entire Document
	68	5464436	A	1995-11-07	Smith	Entire Document
	69	5549660	A	1996-08-27	Mendes et al.	Entire Document
	70	5551949	A	1996-09-03	Kim	Entire Document
	71	5553148	A	1996-09-03	Werle	Entire Document
	72	5569307	A	1996-10-29	Schulman et al.	Entire Document
	73	5575761	A	1996-11-19	Hajianpour	Entire Document
	74	5578065	A	1996-11-26	Hattori et al.	Entire Document

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	75	5616140	A	1997-04-01	Prescott	Entire Document
	76	5627548	A	1997-05-06	Woo et al.	Entire Document
	77	5665053	A	1997-09-09	Jacobs	Entire Document
	78	5719561	A	1998-02-17	Gonzales	Entire Document
	79	5779483	A	1998-07-14	Cho	Entire Document
	80	5800479	A	1998-09-01	Thiberg	Entire Document
	81	5843074	A	1998-12-01	Cocilovo	Entire Document
	82	5865771	A	1999-02-02	Shuto et al.	Entire Document
	83	5876427	A	1999-03-02	Chen et al.	Entire Document
	84	5895348	A	1999-04-20	Hosaka	Entire Document
	85	5913883	A	1999-06-22	Alexander et al.	Entire Document

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	86	5935155	A	1999-08-10	Humayun et al.	Entire Document
	87	5944748	A	1999-08-31	Mager et al.	Entire Document
	88	5948006	A	1999-09-07	Mann	Entire Document
	89	5957569	A	1999-09-28	Helbig et al.	Entire Document
	90	5957960	A	1999-09-28	Chen et al.	Entire Document
	91	6038485	A	2000-03-14	Axelgaard	Entire Document
	92	6045575	A	2000-04-04	Rosen et al.	Entire Document
	93	6063108	A	2000-05-16	Salansky et al.	Entire Document
	94	6074411	A	2000-06-13	Lai et al.	Entire Document
	95	6096066	A	2000-08-01	Chen et al.	Entire Document
	96	6099554	A	2000-08-08	Nordquist et al.	Entire Document

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	97	6104820	A	2000-08-15	Soza	Entire Document
	98	6107466	A	2000-08-22	Hasan et al.	Entire Document
	99	6156028	A	2000-12-05	Prescott	Entire Document
	100	6228103	B1	2001-05-08	Grey et al.	Entire Document
	101	6275213	B1	2001-08-14	Tremblay et al.	Entire Document
	102	6277085	B1	2001-08-21	Flynn	Entire Document
	103	6400989	B1	2002-06-04	Eckmiller	Entire Document
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	Attorney Docket Number	DF-P01-US08

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
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Examiner Signature	/MARK R GAWORECKI/	Date Considered	02/05/2024

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/MATTHEW R. LEAPER/	Date (YYYY-MM-DD)	2023-12-01
Name/Print	Matthew R. Leaper	Registration Number	73,966

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Bibliographic Data

Application No: 18/526,980

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /MARK R GAWORECKI/ Examiner's Signature | Initials

Title: COMMUNICATION DEVICES, METHODS, AND SYSTEMS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/01/2023	600	2884	DF-P01-US08
RULE			

APPLICANTS

DATAFEEL INC., Washington, DC, UNITED STATES

INVENTORS

Matthew Robert Leaper, Omaha, NE, UNITED STATES

CONTINUING DATA

This application is a CON of 18388489 11/09/2023

18388489 is a CON of 18143142 05/04/2023 PAT 11864914

18143142 is a CON of 18092398 01/02/2023 PAT 11684313

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Signature	/MARK R GAWORECKI/	Date Considered	02/05/2024

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.R.G/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2023-12-01
	First Named Inventor	Matthew Robert Leaper
	Art Unit	
	Examiner Name	
	Attorney Docket Number	DF-P01-US08

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/MATTHEW R. LEAPER/	Date (YYYY-MM-DD)	2023-12-01
Name/Print	Matthew R. Leaper	Registration Number	73,966

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.R.G/

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.R.G/

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/526,980	Leaper, Matthew Robert
	Examiner	**Art Unit**
	MARK R GAWORECKI	2884

CPC						
Symbol					**Type**	**Version**
A61H	/	23	/	006	F	2013-01-01
A61H	/	23	/	02	I	2013-01-01
A61B	/	5	/	486	I	2013-01-01
A61N	/	1	/	0456	I	2013-01-01
A61N	/	1	/	36014	I	2013-01-01
A61H	/	2201	/	0207	A	2013-01-01
A61H	/	2205	/	065	A	2013-01-01
A61H	/	2201	/	0153	A	2013-01-01
A61H	/	2201	/	1664	A	2013-01-01
A61H	/	2230	/	065	A	2013-01-01
A61H	/	2201	/	123	A	2013-01-01
A61B	/	5	/	7435	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/MARK R GAWORECKI/ Primary Examiner, Art Unit 2884	05 February 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7B

U.S. Patent and Trademark Office — Part of Paper No.: 20240205

Petitioner Therabody Ex-1004, 0932

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/526,980	Leaper, Matthew Robert
	Examiner	**Art Unit**
	MARK R GAWORECKI	2884

INTERNATIONAL CLASSIFICATION				
CLAIMED				
A61B	/	5	/	11
A61B	/	5	/	00
A61N	/	1	/	04
A61N	/	1	/	36
G06F	/	3	/	01
A61H	/	23	/	02
A61H	/	23	/	00

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/MARK R GAWORECKI/ Primary Examiner, Art Unit 2884	05 February 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7B

U.S. Patent and Trademark Office — Part of Paper No.: 20240205

Petitioner Therabody Ex-1004, 0933

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/526,980	Leaper, Matthew Robert
	Examiner	**Art Unit**
	MARK R GAWORECKI	2884

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	10	19	19										
2	2	11	11	20	20										
3	3	12	12												
4	4	13	13												
5	5	14	14												
6	6	15	15												
7	7	16	16												
8	8	17	17												
9	9	18	18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/MARK R GAWORECKI/ Primary Examiner, Art Unit 2884	05 February 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7B

U.S. Patent and Trademark Office — Part of Paper No.: 20240205

Petitioner Therabody Ex-1004, 0934

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	7902	a61b5/1112.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:07 PM
L2	5034	a61b5/1114.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:07 PM
L3	7999	a61b5/4848.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:07 PM
L4	10555	a61b5/486.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:07 PM
L5	17444	a61b5/681.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:07 PM
L6	9490	a61b5/6833.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:07 PM
L7	4154	a61b2560/0412.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:08 PM
L8	3130	a61b2560/0468.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:08 PM
L9	8607	a61n1/0456.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:08 PM
L10	5168	a61n1/0484.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:08 PM
L11	67262	L1 L2 L3 L4 L5 L6 L7 L8 L9 L10	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:08 PM
L12	1	(matthew with robert with leaper).in.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:09 PM
L13	0	(datafeel).aanm.	(US-PGPUB; USPAT;	OR	OFF	OFF	2020/11/09

Petitioner Therabody Ex-1004, 0935

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)				02:09 PM
L14	2409	L11 and (communicat$3 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:42 PM
L15	800	L11 and (communicat$3 with nerve$1)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:46 PM
L16	93	("10371544"|"20110148607"|"20140198035"|"20140266570"|"20140266571"|"20150290454"|"20160165965"|"20160187977"|"20160267344"|"20160338644"|"20170095692"|"20170095693"|"20170156662"|"6275213"|"7390157"|"8362882"|"9008794"|"9024874"|"9083821"|"9092954"|"9198792"|"9274603"|"9308363"|"9408316"|"9466187"|"9553625"|"9582034"|"9754078"|"9936900"|"9940811"|"10019912"|"10070799"|"10198076"|"20040040800"|"20040210122"|"20040241623"|"20070016425"|"20100073150"|"20100141407"|"20100162109"|"20100259472"|"20100304864"|"20120035513"|"20120232780"|"20130218456"|"20140085077"|"20140184384"|"20140198034"|"20150201181"|"20150235529"|"20150339899"|"20160195928"|"20160349790"|"20170004685"|"20180303702"|"20180307314"|"20190064924"|"20190076643"|"2327222"|"3108268"|"3594787"|"3848608"|"4167189"|"4510939"|"4926879"|"5449378"|"5719561"|"6038485"|"6712613"|"7013179"|"7110820"|"7324094"|"7687678"|"7696860"|"8170656"|"8175718"|"8308558"|"8364257"|"8369944"|"8633907"|"869	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/11/09 02:48 PM

Petitioner Therabody Ex-1004, 0936

		6357"|"8766786"|"8965500"|"9042971"|"9046919"|"9195350"|"9282893"|"9364667"|"9417694"|"9454915"|"9607492"|"9652946"|"9884179").PN.					
L17	3	"20160129248".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 02:50 PM
L18	1225	L11 and (tissue with interface)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 03:16 PM
L19	1406	L11 and (tissue with interface)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:16 PM
L20	147	L15 and L19	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:20 PM
L21	47590	(plurality multiple) with different with energy	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:21 PM
L22	8	L14 and L21	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:21 PM
L23	11	L15 and L21	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:21 PM
L24	31	L19 and L21	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:21 PM
L25	41	L22 L23 L24	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:21 PM
L26	331	L11 and (communicat$3 near3 nerve$1)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 03:46 PM
L27	1761	L11 and (output$4 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 03:49 PM
L28	1761	L11 and (output$4 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2020/11/09 03:49 PM

Petitioner Therabody Ex-1004, 0937

			IBM_TDB)				
L29	57	L11 and (output$4 with skin with energy)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:49 PM
L30	57	L11 and (output$4 with skin with energ$3)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:49 PM
L31	2	L26 and L30	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:50 PM
L32	320	L15 and (attach$4 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:57 PM
L33	7	L15 and (plurality with energy with typ$2)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 03:58 PM
L34	7902	a61b5/1112.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L35	5034	a61b5/1114.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L36	7999	a61b5/4848.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L37	10555	a61b5/486.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L38	17444	a61b5/681.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L39	9490	a61b5/6833.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L40	4154	a61b2560/0412.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L41	3130	a61b2560/0468.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM

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L42	8607	a61n1/0456.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L43	5168	a61n1/0484.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L44	67262	L1 L2 L3 L4 L5 L6 L7 L8 L9 L10	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L45	0	(datafeel).aanm.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L46	1	(matthew with robert with leaper).in.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L47	2409	L11 and (communicat$3 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L48	800	L11 and (communicat$3 with nerve$1)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L49	93	("10371544"|"20110148607"|"20140198035"|"20140266570"|"20140266571"|"20150290454"|"20160165965"|"20160187977"|"20160267344"|"20160338644"|"20170095692"|"20170095693"|"20170156662"|"6275213"|"7390157"|"8362882"|"9008794"|"9024874"|"9083821"|"9092954"|"9198792"|"9274603"|"9308363"|"9408316"|"9466187"|"9553625"|"9582034"|"9754078"|"9936900"|"9940811"|"10019912"|"10070799"|"10198076"|"20040040800"|"20040210122"|"20040241623"|"20070016425"|"20100073150"|"20100141407"|"20100162109"|"20100259472"|"20100304864"|"20120035513"|"20120232780"|"20130218456"|"20140085	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/11/09 04:11 PM

Petitioner Therabody Ex-1004, 0939

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L50	3	"20160129248".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L51	1225	L11 and (tissue with interface)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L52	1406	L11 and (tissue with interface)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L53	147	L15 and L19	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L54	47590	(plurality multiple) with different with energy	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L55	8	L14 and L21	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L56	11	L15 and L21	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L57	31	L19 and L21	(US-PGPUB; USPAT;	OR	ON	ON	2020/11/09

Petitioner Therabody Ex-1004, 0940

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)				04:11 PM
L58	41	L22 L23 L24	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L59	331	L11 and (communicat$3 near3 nerve$1)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L60	1761	L11 and (output$4 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2020/11/09 04:11 PM
L61	1761	L11 and (output$4 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L62	57	L11 and (output$4 with skin with energy)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L63	57	L11 and (output$4 with skin with energ$3)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L64	2	L26 and L30	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L65	320	L15 and (attach$4 with skin)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L66	7	L15 and (plurality with energy with typ$2)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/11/09 04:11 PM
L67	50	("4770410" "5637144" "6145625" "4246184" "4269744" "4286481" "4301570" "4302939" "4436326" "4448396" "4551623" "4555258" "4796926" "4806203" "4836893" "4921707" "5188692" "5202667" "5250146" "5406914" "5494546" "6036446" "4243070" "4257482" "4269611" "4272640" "4273374" "4281805" "4288558" "4299530"	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/11/09 04:55 PM

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		"4310334" "4320333" "4324078" "4324921" "4330553" "4334908" "4336606" "4338499" "4338737" "4347679" "4352957" "4355357" "4359761" "4360187" "4362072" "4365112" "4366353" "4367229" "4375510" "4381127").pn.					
L68	2	"20020143373".pn.	(US-PGPUB; USPAT; USOCR; FIT (CN, FR, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/05/26 09:31 AM
L69	9605	a61b5/1112.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L70	6758	a61b5/1114.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L71	10231	a61b5/4848.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L72	12908	a61b5/486.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L73	23156	a61b5/681.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L74	12193	a61b5/6833.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L75	4958	a61b2560/0412.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L76	3792	a61b2560/0468.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L77	10890	a61n1/0456.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2022/05/26 10:24 AM
L78	6619	a61n1/0484.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	OFF	2022/05/26 10:24 AM

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