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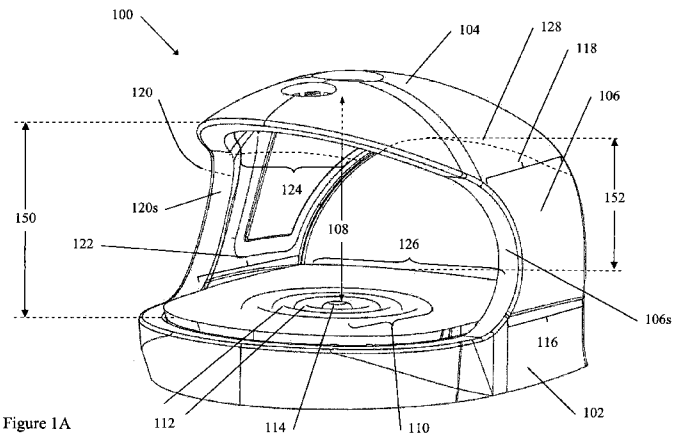

Figure 1A

(57) Abstract: According to one aspect of the invention, there is provided a hand massaging device including: a base; a top opposite the base; a wall connecting the base to the top, wherein the base, the top and the wall enclose a space accessible via an opening, the space adapted to accommodate a hand or fingers of the hand to be massaged; and further comprising a first massager disposed on or above the base, the first massager designed to provide a massage to the hand or fingers of the hand when the hand or fingers of the hand is placed within the space and the first massager is activated.

Hand Massaging Device

Field Of The Invention

[0001] The invention relates to a hand massaging device.

Background Of The Invention

[0002] It is common for people to spend many hours a day using a keyboard and a mouse while working on a computer terminal.

[0003] Extended use of the keyboard and the mouse causes strain and fatigue in the muscles and joints of the user's hands. One way to relieve this strain and fatigue is through massaging the human hand.

[0004] Massage devices that specifically target the hands are disclosed in publications US2007/0255187, JP2004160120 and US5601529.

[0005] For instance, US2007/0255187 discloses a device for providing therapy to a user including vibration and temperature modulation. The device may take the form of a full or partial glove which surrounds all or part of a user's hand. The device comprises at least one removable vibrator adapted to provide massage therapy to the user.

[0006] JP2004160120 discloses gloves formed of flexible material, with vibrators mounted at the fingertips. The vibrators are wired to a power supply mounted on the wrist part of each glove. A user's fingertips are thus massaged by powering the vibrators.

[0007] US5601529 discloses a panel that is adapted to be placed upon the back of a user's hand, with extensions being placed adjacent the top of the user's middle finger and adjacent the top of the user's thumb. In this manner, the device of US5601529 becomes shaped like a partial glove. A vibration motor is coupled to each of the middle finger and thumb extensions. The vibration motors are wired to a power source and controller that are mounted on the panel placed upon the back of the user's hand.

[0008] Thus, US2007/0255187, JP2004160120 and US5601529 share a common feature that the disclosed massage devices are glove-shaped. Such glove-shaped

devices have at least one disadvantage of requiring set-up in that a user would have to fit the glove-shaped device over his hand to have his hand massaged. Another disadvantage is that the user's other hand would have to be assist in fitting the glove-shaped device over the hand to be massaged. Thus, users with physical disability in one hand may not be able to effectively use such glove-shaped devices.

[0009] It would be advantageous to have a hand massaging device which a user finds simple to use and requires little set-up before the hand massaging device can be used to massage the user's hand.

Summary Of The Invention

[0010] According to embodiments of the invention, there is provided a hand massaging device including: a base; a top opposite the base; a wall connecting the base to the top, wherein the base, the top and the wall enclose a space accessible via an opening, the space adapted to accommodate a hand or fingers of the hand to be massaged; and further comprising a first massager disposed on or above the base, the first massager designed to provide a massage to the hand or fingers of the hand when the hand or fingers of the hand is placed within the space and the first massager is activated.

[0011] According to embodiments of the invention, there is provided a hand massaging device including: a base; a top opposite the base; a wall connecting the base to the top, wherein the base, the top and the wall enclose a space accessible via an opening, the space adapted to accommodate a hand to be massaged; and further comprising a first massager disposed on or above the base, the first massager designed to be in contact with the hand and operable to provide a massage to the hand.

[0012] In one embodiment, the first massager may be designed to be in contact with the palm surface of the hand. The first massager may also contact the fingers of the hand and provide a massage to the fingers, should only the fingers be introduced into the space enclosed by the base, the top and the wall. In another embodiment, a layer of sponge may surround the space enclosed by the base, the top and the wall, where the first massager may be designed to massage the palm surface of the hand or

fingers of the hand through the layer of sponge, so that the first massager does not come into direct contact with the palm of the hand or fingers of the hand.

[0013] In one embodiment, a further wall may connect the base to the top, wherein the base, the top, the wall and the further wall enclose the space adapted to accommodate the hand to be massaged.

[0014] In one embodiment, the wall and the further wall may be spaced apart to form a further opening between the wall and the further wall, the further opening located opposite to the opening, so that when the space accommodates the hand, the fingers of the hand protrude beyond the further opening.

[0015] In one embodiment, a second massager may extend from an interior surface of the wall to part of an interior surface of the top, the second massager designed to provide a massage to an area of the hand ranging from the first web space to a portion of the dorsal.

[0016] In one embodiment, a third massager may extend from an interior surface of the further wall to part of an interior surface of the top, the third massager designed to provide a massage to an area of the hand ranging from the hypothenar eminence to a portion of the dorsal.

[0017] In one embodiment, a fourth massager may be disposed on or below the bottom surface of the top, wherein the fourth massager may be designed to provide a massage to the dorsal surface of the hand.

[0018] In one embodiment of the invention, one or more of the second massager, the third massager and the fourth massager may be designed to be in contact with respective surfaces of the hand. In another embodiment, one or more of the second massager, the third massager and the fourth massager may be designed to massage the respective surfaces of the hand through the layer of sponge, so that the one or more of the second massager, the third massager and the fourth massager do not come into direct contact with the palm of the hand. In embodiments of the invention, the first massager, the second massager, the third massager and the fourth massager may be a single unitary piece and not separate massagers.

[0019] In one embodiment, any one or more of the first massager, the second massager, the third massager and the fourth massager may include any one or more of an inflatable chamber, an electrode or a roller.

[0020] In one embodiment, the inflatable chamber of one or more of the second massager, the third massager and the fourth massager may have a surface including an arrangement of protruding concentric rings; and a protrusion formed in the centre of the protruding concentric rings. In another embodiment, the inflatable chamber may include airbags as described in WO 2008/051165. Such airbags include a first monolithic layer and a second monolithic layer, wherein the first and second monolithic layers are attached to each other to define there between a chamber that is bounded by a closed line. The first monolithic layer rests on the second monolithic layer and is of an at least substantially corrugated shape when the chamber is deflated. The airbag may also include at least one fluid port in fluid communication with the fluid chamber. The corrugated shape allows a user to experience more compressive force during a massage.

[0021] In one embodiment, a vibrator may be disposed on or above the base. The vibrator may include one or more protrusions or nodes. The one or more protrusions or nodes may include a central protrusion (or a big profile node) and two protrusions (or smaller nodes) disposed adjacent to the central protrusion, the central protrusion being larger than the two protrusions. The central protrusion may accommodate the center of a palm while the two small nodes may accommodate the base or wrist of the palm of the hand. The central protrusion 1264a may provide a bigger massaging surface area or larger profile, so as to accommodate the palm, compared to the protrusions 1264b, which are designed to accommodate the wrist of the palm.

[0022] In one embodiment, the vibrator may be mounted onto a layer of foam or rubber to provide maximum vibration effect to the palm. The vibrator with the layer of foam or rubber may rest above the first massager.

[0023] In one embodiment, the base may have a 3D arch ergonomic profile to fit the contour of the palm.

[0024] In one embodiment, the hand massaging device may include an activator adapted to operate any one or more of the first, the second, the third and the fourth

massagers. The activator may include any one or more of the following components: an air pump, an amplifier or a motor, an electromagnetic valve or solenoid, in order to respectively activate the inflatable chamber, the electrode or the roller of the first, the second, the third and the fourth massagers.

[0025] In one embodiment, the hand massaging device may include a noise suppressing unit coupled to the activator. The noise suppressing unit may, in embodiments of the invention, reduce the noise generated (such as audible or electronic) by the activator. For instance, when the activator is an air pump or a motor, the noise suppressing unit may include a sponge. When the activator is an amplifier, the noise suppressing unit may be a filter.

[0026] In one embodiment, the hand massaging device may include a stopper pad disposed on the bottom surface of the base. The stopper pad may provide a zone of increased friction when the hand massaging device is placed on a surface, to prevent the hand massaging device from being displaced when in operation. The stopper pad may include rubber.

[0027] In one embodiment, a processor may control the massaging operation of the first massager, the second massager, the third massager, the fourth massager and the vibrator.

[0028] In one embodiment, a cable with a USB plug for connecting to a USB port of a computer may power the processor. A compartment may be provided to house a power source. The compartment may be formed in any one or more of the top, the base, the wall or the further wall. The power source may include any one or more of the following: batteries, externally connected batteries or a port adapted to be powered by a wall socket. An AC/DC adapter may be provided to connect the port to the wall socket.

[0029] In one embodiment, a compartment within the base may house the cable and the USB plug.

[0030] In one embodiment, a conformable layer may be disposed between the vibrator and the first massager. The conformable layer may be a structure which has resilient properties, i.e. does not easily deform, but yet is flexible enough to be able

to adapt to the contour of the surface the conformable layer is placed upon. The conformable layer may include a layer of foam.

Brief Description Of The Drawings

[0031] In the drawings, like reference characters generally refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the invention. In the following description, various embodiments of the invention are described with reference to the following drawings, in which:

[0032] Figure 1A is a perspective view of a hand massaging device according to one embodiment of the present invention.

[0033] Figure 1B shows a perspective view of a hand massaging device, according to one embodiment of the present invention, with a user's left hand inserted.

[0034] Figure 1C shows a perspective view of the hand massaging device, according to one embodiment of the present invention, with a user's right hand inserted.

[0035] Figure 2 is an exploded view of a hand massaging device according to one embodiment of the present invention.

[0036] Figure 3 is an exploded view of a hand massaging device according to one embodiment of the present invention.

[0037] Figures 4 and 5 are different perspective views of a hand massaging device according to one embodiment of the present invention.

[0038] Figure 6 is a perspective view of a hand massaging device according to one embodiment of the present invention.

[0039] Figure 7 is a perspective view of a hand massaging device according to one embodiment of the present invention.

[0040] Figure 8 is a perspective view of a hand massaging device according to one embodiment of the present invention.

[0041] Figure 9 is a perspective view of a hand massaging device according to one embodiment of the present invention.

[0042] Figure 10 is a perspective view of a hand massaging device according to one embodiment of the present invention.

[0043] Figure 11 is a perspective view of a hand massaging device according to one embodiment of the present invention.

[0044] Figure 12 is an exploded view of a hand massaging device according to one embodiment of the present invention.

[0045] Figures 13 and 14 are different perspective views of a hand massaging device according to one embodiment of the present invention.

[0046] Figure 15 shows key acupressure points of the hand.

[0047] Figure 16 shows a cross-sectional view of a hand massaging device according to one embodiment of the present invention.

[0048] Figures 17 to 20 show various air bags used in accordance to embodiments of the invention.

Detailed Description

[0049] While embodiments of the invention will be shown and described with reference to specific embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention as defined by the appended claims. The scope of the invention is thus indicated by the appended claims and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced.

[0050] It will be appreciated that common numerals, used in the relevant drawings, refer to components that serve a similar or the same purpose.

[0051] Figure 1A is a perspective view of a hand massaging device 100 according to one embodiment of the present invention.

[0052] The hand massaging device 100 has a base 102 and a top 104 opposite the base 102. A wall 106 connects the base 102 to the top 104, wherein the base 102, the top 104 and the wall 106 enclose a space 108 accessible via an opening 150, the space 108 adapted to accommodate a hand (not shown in Figure 1A for the sake of clarity, but shown in Figures 1B and 1C) to be massaged. The hand massaging

device 100 also has a first massager 110 disposed on or above the base 102, so that the first massager 110 is within the space 108. In the embodiment shown in Figure 1A, the first massager 110 is designed to be in contact with the hand and operable to provide a massage to the hand.

[0053] On the other hand, a layer of sponge (not shown) may surround the space 108 enclosed by the base 102, the top 104 and the wall 106. The first massager 110 may be positioned between the layer of sponge and the base 102, so that the first massager 110 is not in contact with the hand. However, the first massager 110 is still able to provide a massage to the hand when the hand is placed within the space 108 and the first massager 110 is activated.

[0054] The size of the space 108 is such that a compressive force is experienced by the hand when placed inside the space 108. The compressive force provides for a more effective massage by having the first massager 110 already press against the hand even when the massager 110 is not in operation and also prevents the hand from easily slipping out of the space 108. The size of the space 108 is determined by the relative distance between the base 102 and the top 104, which affects the distance between the first massager 110 and the top 104. A larger space 108 reduces the amount of compressive force applied experienced by the hand.

[0055] The hand massaging device 100 has several advantages compared with known glove-shaped hand massaging devices having a massage element. It is more convenient to simply insert the hand into the space 108 (see Figure 7) of the hand massaging device 100, rather than fitting the glove-shaped massaging device over the hand and subsequently securing the glove-shaped massaging device to the hand.

[0056] In the embodiment shown in Figure 1A, the first massager 110 is an inflatable chamber designed to be in contact with the palm of the hand. The inflatable chamber 110 has a surface being an arrangement of protruding concentric rings 112. A protrusion 114 is formed in the centre of the protruding concentric rings 112, the central protrusion 114 being designed to be positioned around the centre of the palm of the hand to be massaged. The central protrusion 114 is designed to be in the vicinity of the centre of a user's palm, where the hand's Laogong acupuncture point is located.

[0057] The central protrusion 114 and the protruding concentric rings 112 provide zones of greater massaging intensity, as compared to if the central protrusion 114 and the protruding concentric rings 112 are absent. Compared to the massaging intensity provided by the protruding concentric rings 112, the central protrusion 114 provides a greater massaging intensity to provide a stronger massage to the "Laogong" acupuncture point. Massaging the "Laogong acupuncture" point is known to bring about stimulating effects on the following organs: lung, heart, liver, solar plexus, kidney and respiratory organs. Thus, when a user places his hand inside the hand massaging device 100, the user will experience the effects brought about from massaging of the "Laogong" acupuncture point, located around the centre of the palm.

[0058] The first massager 110 is designed to be in contact with the palm of the hand. The first massager 110 may be any one of a group of a vibrating element, an electrode or a roller. It is to be understood that other types of massagers may be used.

[0059] In the embodiment shown in Figure 1A, the wall 106 extends from a perimeter first portion 116 of the base 102 to a corresponding perimeter first portion 118 of the top 104.

[0060] In the embodiment shown in Figure 1A, the hand massaging device 100 has a further wall 120 connecting the base 102 to the top 104. The further wall 120 extends from a perimeter second portion 122 of the base 102 to a corresponding perimeter second portion 124 of the top 104. The further wall 120 is arranged so that the base 102, the top 104, the wall 106 and the further wall 120 enclose the space 108 adapted to accommodate the hand to be massaged.

[0061] Figure 1B shows a perspective view of the hand massaging device 100 of Figure 1, with the left hand of a user inserted. When the left hand is inserted into the space 108 (see Figure 1A), the wall 106 provides the additional advantage of engaging the first web space of the left hand so that the palm of the left hand is positioned over the first massager 110. In another embodiment, the space 108 may be wide enough to fully accommodate the entire hand of the user.

[0062] Figure 1C shows a perspective view of the hand massaging device 100 of Figure 1, with the right hand of a user inserted. When the right hand is inserted into the space 108 (see Figure 1A), the further wall 120 provides the additional advantage of engaging the first web space of the right hand so that the palm of the right hand is positioned over the first massager 110. In another embodiment, the space 108 may be wide enough to fully accommodate the entire hand of the user.

[0063] Returning to Figure 1A, the surfaces (106s and 120s), which respectively contact the first web spaces of both the left and right hands, of the wall 106 and the further wall 120 are curved. The curved surfaces 106s and 120s provide more comfort to the first web space of the respective hand, as compared to having flat surfaces. The curved surfaces (106s and 120s) provide a stiff casing structure so as to withstand the reaction of the compressive force by the first massager 110 acting on the top 104 and the base 102.

[0064] The wall 106 and the further wall 120 are spaced apart to form a further opening 152 between the wall 106 and the further wall 120. The further opening 152 is located opposite to the opening 150, so that when the space accommodates the hand, the fingers of the hand protrude beyond the further opening 152.

[0065] In the embodiment shown in Figure 1A, the wall 106 and the further wall 120 are located opposite to each other, so that the base perimeter first portion 116 and the base perimeter second portion 122 are located opposite to each other. Thus, when the space 108 accommodates the hand, the fingers can protrude beyond a perimeter portion 126 between the base perimeter first portion 116 and the base perimeter second portion 122. Correspondingly, the figures of the hand can also protrude beyond a perimeter portion 128 between the top perimeter first portion 118 and the top perimeter second portion 124.

[0066] The further opening 152 provides that there would be no obstruction should a user fully extend his fingers, as the fingers are allowed to protrude beyond the base 102 of the hand massaging device 100. The further opening 152 also means that less material is required to manufacture the hand massaging device 100, as opposed to having the wall 106 and the further wall 120 extend to form a unitary piece (i.e. having no further opening 152 between the wall 106 and the further wall

120). Disadvantageously, the unitary piece may prevent a user from fully extending his fingers when his hand is inside the massaging device. Thus, a more comfortable massage experience is provided by having the further opening 152 between the wall 106 and the further wall 120. In addition, for the same base 102 size, the hand massaging device 100 is able to accommodate a wider range of hand sizes with different finger lengths. Thus, with the further opening 152, factoring in the length of a user's fingers is not a concern in manufacturing the hand massaging device 100.

[0067] Figure 2 is an exploded view of the hand massaging device 100 of Figure 1A.

[0068] In the embodiment shown in Figure 2, a unitary piece outer case 202 provides an exterior surface to each of the top 104, the wall 106, the further wall 120 and side walls of the base 102.

[0069] A unitary piece inner case 204 forms an interior surface 104i of the top 104, an interior surface 106i of the wall 106 and an interior surface 120i of the further wall 120. When the hand massaging device 100 is assembled, the inner case 204 is mounted inside the outer case 202.

[0070] The hand massaging device 100 further includes a second massager 206 and a third massager 220.

[0071] When the hand massaging device 100 is assembled, the second massager 206 is attached to the inner case 204. The second massager 206 extends from the interior surface 106i of the wall 106 to a portion of the interior surface 104i of the top 104. In this manner, the second massager 206 designed to be in contact with an area of the hand ranging from the first web space to a portion of the dorsal.

[0072] When the hand massaging device 100 is assembled, the third massager 220 is attached to the inner case 204. The third massager 220 extends from the interior surface 120i of the further wall 120 to a portion of the interior surface 104i of the top 104. In this manner, the third massager 220 is designed to be in contact with an area of the hand ranging from the hypothenar eminence to a portion of the dorsal.

[0073] The hand massaging device 100 further includes a processor 208 mounted on a remote PCB board 210, where the processor 208 may be connected with other

electronic devices present on the remote PCB board 210. The processor 208 may be controlled by switches 212 disposed in the exterior surface of the top 104. When the hand massaging device 100 is assembled, the remote PCB board 210 is mounted between the inner case 204 and the outer case 202, where the remote PCB board 210 is coupled by wires (not shown) to the switches 212 to allow electrical communication between the switches 212 and the remote PCB board 210. The switches 212 are used to select one of the massaging operations pre-programmed inside the processor 208 or can be used to switch the hand massaging device 100 on or off.

[0074] A bottom compartment 242 is disposed within the base 102. The bottom compartment 242 includes a lower case 214 and a bottom case 216. When the hand massaging device 100 is assembled, the lower case 214 is mounted onto the bottom case 216.

[0075] The bottom case 216 has a depression for accommodating components required to facilitate operation of the hand massaging device 100. For instance, a solenoid mounting area 218 is present on the bottom case 216 for thereupon mounting solenoids 228. A pump mounting area 222 is present on the bottom case 216 for thereupon mounting a pump 224. The pump 224 has one outlet, where the outlet is coupled to a solenoid 228 to direct fluid from the pump 224 into the respective solenoid 228. The solenoid 228 is coupled to an air channeling valve (not shown) having three outlet ports, with each port channeling air to the first 110, second 206 and third 220 massager via a respective fluid tube 226. The air channeling valve has one inlet port to allow fluid to enter for the purpose for channeling the fluid to the respective outlet port.

[0076] In one embodiment, air is used as the working fluid, wherein the pump 224 is an air pump with an inlet opening for drawing air from the surrounding atmosphere. In another embodiment, the working fluid may be a liquid, wherein the pump 224 inlet is coupled to a reservoir (not shown) storing the liquid. The reservoir may be disposed inside the bottom case 216.

[0077] Each solenoid 228 is coupled to a fluid tube 226. Each fluid tube 226 is in turn coupled to either one of the first massager 110, the second massager 206 or the

third massager 220. The pump 224 inflates the first massager 110, the second massager 206 and the third massager 220 through injecting fluid into the first massager 110, the second massager 206 and the third massager 220 via the respectively coupled fluid tube 226. During deflation of the first massager 110, the second massager 206 and the third massager 220, valves (not shown) withdraw fluid from the first massager 110, the second massager 206 and the third massager 220 via the respectively coupled fluid tube 226. The fluid is deflated out from the respective output port of the solenoid valves 228. The periodic repetition of the inflation and the deflation of the first massager 110, the second massager 206 and the third massager 220 causes the massagers 110, 206 and 220 to massage the hand.

[0078] The operation of the pump 224 and the solenoids 228 is controlled by a processor 232 mounted on a main PCB 230. The processor 232 is used to control the massaging operation of the first massager 110, the second massager 206 and the third massager 220. The massaging operation involves controlling both the sequence and duration where the first massager 110, the second massager 206 and the third massager 220 are (as mentioned above) inflated and deflated. The massaging operation is stored as a program inside the processor 232. The main PCB 230 may be in electrical communication with the remote PCB 210 through, for example, wires so that data is transmitted between the main PCB 230 and the remote PCB 210.

[0079] In the embodiment shown in Figure 2, the hand massaging device 100 is designed to be powered by a USB port of a computer. Specifically, the hand massaging device 100 further includes a cable (not shown) with a USB plug 234 for connecting to a USB port of a computer (not shown) to power the processor 232. The pump 224, the solenoids 228 and the processor 208 are connected to the USB plug 234 and are also powered when the USB plug 234 is connected to a USB port of a computer.

[0080] A compartment 236 within the bottom compartment 242 houses the cable (not shown) of the USB plug 234 and the USB plug 234. In the embodiment shown in Figure 2, the compartment 236 is disposed in the bottom case 216 of the bottom compartment 242.

[0081] The hand massaging device 100 further includes a foam layer 238. When the hand massaging device 100 is assembled, the foam layer 238 is disposed between the bottom compartment 242 and the first massager 110, so that the foam layer 238 is mounted onto the lower case 214 of the bottom compartment 242. The advantage of having the foam layer 238 is that it provides comfort to the palm at rest. When a vibrator (not shown) is included as a further massaging element to the hand and placed onto the foam layer 238, the foam layer 238 provides a spring effect to the vibrator and amplifies the vibration to the palm and enhances the massage provided by the hand massaging device 100. A plurality of nodes 240 is provided, either formed directly on the foam layer 238 or as an additional layer placed onto the foam layer 238. These nodes 240 are designed to be in contact with the wrist of the hand to position and support the hand during a massage. In addition, the main PCB 230 is disposed between the foam layer 238 and the lower case 214 when the hand massaging device 100 is assembled.

[0082] Figure 3 is another exploded view of the hand massaging device 100 of Figure 1A.

[0083] Figure 3 illustrates how the solenoids 228, the main PCB board 230 and the pump 224 may be arranged within the bottom case 216 of the bottom compartment 242.

[0084] Figures 4 and 5 are different perspective views of the hand massaging device 100 of Figure 1A.

[0085] The underside of the base 102 can be clearly seen from Figures 4 and 5, which illustrates the location of the compartment 236 within the base 102, the compartment 236 being for the housing of the USB plug 234. A gap 404 is provided at the underside of the base 102 for coiling the USB plug cable (not shown). A second gap 402 positioned along the perimeter portion 126 is used to accommodate the USB plug cable when the USB plug cable is uncoiled for connecting the USB plug 234 to a USB port of a computer. By having the USB plug cable engage with the second gap 402, the base 102 of the hand massaging device 100 would rest fully on a table top without wobbling.

[0086] Figure 6 is another perspective view of the hand massaging device 100 of Figure 1.

[0087] Figure 7 shows the same perspective view of the hand massaging device 100 of Figure 6. However, Figure 7 illustrates the hand massaging device 100 in use, where a user's hand 702 is inserted into the space 108 of the hand massaging device 100, with the palm facing the first massager 110. From Figure 7, it will be appreciated that the first massager 110 is designed to be in contact with the palm of the hand to provide a massage to the hand.

[0088] Figure 8 is a schematic perspective view of a hand massaging device 800 according to one embodiment of the present invention. All details of previous embodiments are omitted for the sake of simplicity.

[0089] The hand massaging device 800 has a base 802 and a top 804 opposite the base 802. A wall 806 connects the base 802 to the top 804, wherein the base 802, the top 804 and the wall 806 enclose a space 808 accessible via an opening 850 , the space 808 adapted to accommodate a hand (not shown) to be massaged. The hand massaging device 800 also has a first massager 810 disposed on the base 802, so that the first massager 810 is within the space 808. The massager 810 is designed to be in contact with the hand and operable to provide a massage to the hand. It will be appreciated that a foam layer (not shown) can also be placed between the first massager 810 and the base 802, so that the first massager 810 is above the base 802.

[0090] Comparing the hand massaging device 800 with the hand massaging device 100 (see Figure 1), one difference is as follows. For the hand massaging device 800, the top 804, which is spaced apart from the base 802, is connected with the base 802 via only one wall (wall 806). On the other hand, for the hand massaging device 100, the top 104, which is spaced apart from the base 102, is connected with the base 102 via two walls (wall 106 and the further wall 120). By only having one wall, a user can also insert his hand into the opening 808 through a side opening 840 of the massaging device 800.

[0091] Figure 9 is a schematic perspective view of a hand massaging device 900 according to one embodiment of the present invention. All details of previous embodiments are omitted for the sake of simplicity.

[0092] The hand massaging device 900 has a base 902 and a top 904 opposite the base 902. A wall 906 connects the base 902 to the top 904, wherein the base 902, the top 904 and the wall 906 enclose a space 908 accessible via an opening 950, the space 908 adapted to accommodate a hand (not shown) to be massaged. The hand massaging device 900 also has a first massager 910 disposed on the base 902, so that the first massager 910 is within the space 908. The massager 910 is designed to be in contact with the hand and operable to provide a massage to the hand. It will be appreciated that a foam layer (not shown) can also be placed between the first massager 910 and the base 902, so that the first massager 910 is above the base 902.

[0093] Comparing the hand massaging device 900 with the hand massaging device 100 (see Figure 1), one difference is as follows. For the hand massaging device 900, the top 904, which is spaced apart from the base 902, is connected with the base 902 via only one wall (wall 906). On the other hand, for the hand massaging device 100, the top 104, which is spaced apart from the base 102, is connected with the base 102 via two walls (wall 106 and the further wall 120). In addition, the wall 906 extends from generally the centre of the base 902 to generally the centre of the top 904. On the other hand, each of the wall 106 and the further wall 120 extend from perimeter portions of the base 102 to corresponding perimeter portions of the top 104.

[0094] By having the wall 906 positioned around the centre of the base 902, the space 908 readily accommodates either the left hand or the right hand of the user. The wall 906 provides the additional advantage of being able to engage one of the second, third or fourth web spaces of the hand, so that the palm of the hand is positioned over the first massager 910. Surface 906s, which contacts the second, third or fourth web spaces of the hand, of the wall 906 may be curved. A curved surface provides more comfort to the second, third or fourth web spaces of the hand, as compared to having a flat surface.

[0095] Figure 10 is a schematic perspective view of a hand massaging device 1000 according to one embodiment of the present invention. All details of previous embodiments are omitted for the sake of simplicity.

[0096] The hand massaging device 1000 has a base 1002 and a top 1004 opposite the base 1002. A wall 1006 connects the base 1002 to the top 1004, wherein the base 1002, the top 1004 and the wall 1006 enclose a space 1008 accessible via an opening 1050 adapted to accommodate a hand (not shown) to be massaged. The hand massaging device 1000 also has a first massager 1010 disposed on the base 1002, so that the first massager 1010 is within the space 1008. The massager 1010 is designed to be in contact with the hand and operable to provide a massage to the hand. It will be appreciated that a foam layer (not shown) can also be placed between the first massager 1010 and the base 1002, so that the first massager 1010 is above the base 1002.

[0097] The hand massaging device 1000 has a further wall 1020 connecting the base 1002 to the top 1004. The further wall 1020 is arranged so that the base 1002, the top 1004, the wall 1006 and the further wall 1020 enclose the space 1008 adapted to accommodate the hand to be massaged.

[0098] Comparing the hand massaging device 1000 with the hand massaging device 100 (see Figure 1), one difference is as follows. For the hand massaging device 1000, the top 1004, which is spaced apart from the base 1002, is connected with the base 1002 via three walls (wall 1006, further wall 1020 and a third wall 1060). On the other hand, for the hand massaging device 100, the top 104, which is spaced apart from the base 102, is connected with the base 102 via two walls (wall 106 and the further wall 120).

[0099] In conjunction with a wide enough base 1002, the third wall 1060 provides that the space 1008 entirely accommodates the hand to be massaged. In this manner, the first massager 1010 can also massage the fingers of the user's hand when the space 1008 entirely accommodates the user's hand.

[00100] Figure 11 is a perspective view of a hand massaging device 1100 according to one embodiment of the present invention.

[00101] The hand massaging device 1100 has a base 1102 and a top 1104 opposite the base 1102. A wall 1106 and a further wall 1120 connect the base 1102 to the top 1104. The base 1102, the top 1104 and either or both of the wall 1106 and the further wall 1120 enclose a space 1108 accessible via an opening 1150, the space

1108 adapted to accommodate a hand (not shown) to be massaged. A layer of sponge 1138 lines the interior of the wall 1106 and the further wall 1120, so as to surround the space 1108 enclosed by the base 1102, the top 1104 and either or both of the wall 1106 and the further wall 1120.

[00102] The hand massaging device 1100 also has a first massager 1110 disposed on or above the base 1102. In the embodiment shown in Figure 11, the first massager 1110 is beneath the layer of sponge 1138, the first massager 1110 being disposed on or above the base 1102. The layer of sponge 1138 deforms as the first massager 1110 is activated, so that the first massager 1110 provides a massage to a hand when the hand is placed within the space 1108.

[00103] The height of the lower sponge 1138 is non-uniform in that there is a raised portion 1138r with a peak height. The raised portion 1138r has a 3D arch ergonomic profile to allow the palm of a hand to rest comfortably during the massage. Further, the raised portion 1138r serves to constrain the size of the space 1108 so that a compressive force is experienced by the hand when placed inside the space 1108. The compressive force provides for a more effective massage by having the lower sponge 1138 already press against the hand even when the massager 1110 is not in operation and also prevents the hand from easily slipping out of the space 1108. In an embodiment where the first massager 1110 is an airbag, the shape of the lower sponge 1138 may change as the airbag deflates or inflates.

[00104] The raised portion 1138r provides a zone of greater massaging intensity, as compared to if the raised portion 1138r is absent. The portion of the hand in contact with the raised portion 1138r will experience a stronger massaging intensity compared to the remainder of the lower sponge 1138 having a lower height than the raised portion 1138r.

[00105] Figure 12 is an exploded view of the hand massaging device 1100 of Figure 11.

[00106] The hand massaging device 1100 is similar to the hand massaging device 100 of Figure 2.

[00107] In the embodiment shown in Figure 12, a unitary piece outer case 1202 provides an exterior surface to each of the top 1104, the wall 1106, the further wall 1120 and side walls of the base 1102.

[00108] The hand massaging device 1100 further includes a remote PCB board 1209 having electronics that control operation of the hand massaging device 1100. The remote PCB board 1209 may be connected using wires (not shown) to allow signal communication with other electronics (such as PCB main board 1230) that are present in the hand massaging device 1100. The electronics of the remote PCB board 1209 are activated by switches 1204 externally accessible through respective openings 1212 formed in the outer case 1202. The switches 1204 are used to select one of the massaging operations pre-programmed inside a processor 1232 (which, in this embodiment, is mounted on PCB main board 1230) or can be used to switch the hand massaging device 1100 on or off.

[00109] The hand massaging device 1100 further includes a unitary piece inner case 1206. When the hand massaging device 1100 is assembled, the remote PCB board 1209 is mounted between the inner case 1206 and the outer case 1202, with the exterior of the inner case 1206 engaging against the interior of the outer case 1202. The inner case 1206 provides a bottom surface 1104i to the top 1104, an interior surface 1106i to the wall 1106 and an interior surface 1120i to the further wall 1120.

[00110] The hand massaging device 1100 further includes a bezel 1215, a bezel cap 1207, a second massager 1201, a third massager 1220, a fourth massager 1205 and an upper sponge 1208 (being part of the layer of sponge 1138).

[00111] When the hand massaging device 1100 is assembled, the exterior of the upper sponge 1208 is mounted to the interior of the inner case 1206. The second massager 1201 extends from an interior surface 1106i of the wall 1106 to part of an interior surface 1104i of the top 1104. The second massager 1201 is designed to provide a massage to an area of the hand ranging from the first web space to a portion of the dorsal. The third massager 1220 extends from an interior surface 1120i of the further wall 1120 to part of an interior surface 1104i of the top 1104, the third massager 1120 designed to provide a massage to an area of the hand ranging

from the hypothenar eminence to a portion of the dorsal. As the fourth massager 1205 is designed to massage the back or dorsal surfaces of the hand, the fourth massager is disposed on or below the bottom surface 1104i of the top 1104. In the embodiment shown in Figure 12, the second massager 1201, the third massager 1220 and the fourth massager 1205 are disposed between the upper sponge 1208 and the inner case 1206. The upper sponge 1208 deforms as the second massager 1201, the third massager 1220 and the fourth massager 1205 are activated, thereby facilitating a massage through the upper sponge 1208.

[00112] In the embodiment shown in Figure 12, the third massager 1220 and the second massager 1201 are two inflatable chambers, each respectively on the left and right side of the top 1104. Similarly, the first massager 1110 and the fourth massager 1205 are inflatable chambers as well. These inflatable chambers are designed to be in contact on the left and right sides of the dorsal of the hand. Both inflatable chambers may have a surface being an arrangement of protruding concentric rings, with a protrusion formed in the centre of the protruding concentric rings. For the second massager 1201 and the third massager 1220, their central protrusions are designed to be positioned around the side of the dorsal of the palm to be massaged. The central protrusion for both the second massager 1201 and the third massager 1220 are designed to be in the vicinity of where the hand's "Hegu" acupuncture point is located.

[00113] A tubing 1211 supplies air to the fourth massager 1205. Another tubing 1213 supplies air to the second massager 1201. Another tubing (not shown for the sake of simplicity) supplies air to the third massager 1220.

[00114] A greater compressive force will be experienced when the first massager 1110, the second massager 1201, the third massager 1220 and the fourth massager 1205 are inflated (in the embodiment where these four massagers 1110, 1201, 1220 and 1205 are airbags) at the same time. It is also possible to inflate or deflate one or more of the first massager 1110, the second massager 1201, the third massager 1220 and the fourth massager 1205 in an alternating fashion, to produce a twisting massaging effect. For instance, the first massager 1110 and the second massager

1201 may inflate, while the third massager 1220 and the fourth massager 1205 may deflate.

[00115] The hand massaging device 1100 further includes a vibrator 1217. In the embodiment shown in Figure 12, the vibrator 1217 is disposed on or above the cover 1214 and includes one or more protrusions 1264. The one or more protrusions 1264 include a central protrusion 1264a and two protrusions 1264b disposed adjacent to the central protrusion 1264a, the central protrusion 1264a being larger than the two protrusions 1264b. The central protrusion 1264a or larger node provides a bigger massaging surface area or larger profile compared to the protrusions 1264b or smaller nodes. The vibrator 1217 may house a motor 1219 that provides the vibration effect and a motor 1221 cover for the motor 1219.

[00116] The central protrusion 1264a is designed to accommodate the center of the palm of a hand to be massaged, while the two smaller protrusions 1264b are designed to accommodate the base of the palm of the hand.

[00117] The vibrator 1217, where in one embodiment is made of plastic material, works to enhance the massage effected by the fourth massager 1205 and the first massager 1110. The central protrusion 1264a enhances the massage to the "Laogong" acupuncture point, while the smaller protrusions 1264b enhance the massage to the "Shen Men" and the "Tai Yuan" acupuncture points. Massaging the "Shen Men" acupuncture point is known to tonify deficiencies of the HT Qi, blood, Yin and Yang; and alleviate emotional issues, especially those with related sleep or thinking manifestations - insomnia, muddled thinking. Massaging the "Tai Yuan" acupuncture point is known to tonify the lungs, promote lungs descending function, regulate and harmonize the one hundred vessels, activates the channel, transforms phlegm and alleviate pain.

[00118] In the embodiment shown in Figure 12, the first massager 1110 is disposed underneath a lower sponge 2138 of the layer of sponge 1138. A foam or rubber pad (not shown) may be mounted between the vibrator 1217 and the first massager 1110. The foam or rubber pad provides a spring effect to the vibrator 1217, amplifying the vibration to the palm and enhancing the massage provided by the hand massaging

device 1100. In another embodiment (not shown), the first massager 1110 may be located on the lower sponge 1138.

[00119] A bottom compartment 1242 is disposed within the base 1102. The bottom compartment 1242 includes a bottom case 1116 and its respective cover 1214. When the hand massaging device 1100 is assembled, the cover 1214 is mounted onto the bottom case 1116.

[00120] The bottom case 1116 has a depression for accommodating components required to facilitate operation of the hand massaging device 1100. These components include an air pump 1224, electromagnetic valves 1228, selector valves 1250, a PCB main board 1230, a noise suppressing unit 1252 and air connectors 1254. The noise suppressing unit 1252 acts as a vibration isolator and is wrapped around the air pump 1224 to reduce the noise generated from the motor of the air pump 1224. In the embodiment shown in Figure 12, sponge may be used for the noise suppressing unit 1252. An iron plate 1256 secures both the air pump 1224 and the noise suppressing unit 1252 onto the cover 1214 to hold them in place. The air connectors 1254 are used to connect different air tubes together. The pump 1224 is connected (not shown) to the electromagnetic valves 1228, which in turn are connected to the selector valves 1250. Each of the selector valves 1250 is connected to a respective massager (1110, 1201, 1220 and 1205) to direct fluid from the pump 1224 into the respective massager.

[00121] In one embodiment, air is used as the working fluid, wherein the pump 1224 is an air pump with an inlet opening for drawing air from the surrounding atmosphere. In another embodiment, the working fluid may be a liquid, wherein the pump 1224 inlet is coupled to a reservoir (not shown) storing the liquid. The reservoir may be disposed inside the bottom case 1116.

[00122] The electromagnetic valve 1228 is coupled one or more fluid tubes (not shown for the sake of simplicity). Each fluid tube is in turn coupled to either one or more of the first massager 1110, the second massager 1201, the third massager 1220 and the fourth massager 1205. The pump 1224 inflates either one or more of the first massager 1110, the second massager 1201, the third massager 1220 and the fourth massager 1205 through injecting fluid into the first massager 1110, the second

massager 1201, the third massager 1220 and the fourth massager 1205 via the respectively coupled fluid tube. During deflation of the first massager 1110, the second massager 1201, the third massager 1220 and the fourth massager 1205, the selector valves 1250 withdraw fluid from the first massager 110, the second massager 1201, the third massager 1220 and the fourth massager 1205 via the respectively coupled fluid tube to exit from the electromagnetic valves 1228. The periodic repetition of the inflation and the deflation of the first massager 1110, the second massager 1201, the third massager 1220 and the fourth massager 1205 brings about a massage to the hand.

[00123] The operation of the pump 1224 and the electromagnetic valve 1228 is controlled by a processor 1232 mounted on the main PCB 1230. The processor 1232 is used to control the massaging operation of the first massager 1110 and the upper airbag 1205. The massaging operation involves controlling both the sequence and duration where the first massager 1110 and the upper airbag 1205 are (as mentioned above) inflated and deflated. The massaging operation is stored as a program inside the processor 1232. The main PCB 1230 may be in electrical communication with the remote PCB 1209 through, for example, wires so that data is transmitted between the main PCB 1230 and the remote PCB 1209.

[00124] In the embodiment shown in Figure 12, the hand massaging device 1100 is designed to be powered by a USB port of a computer. Specifically, the hand massaging device 1100 further includes a cable (not shown) with a USB plug 1234 for connecting to a USB port of a computer (not shown) to power the processor 1232. The pump 1224, the electromagnetic valve 1228 and the processor 1232 are connected to the USB plug 1234 and are also powered when the USB plug 1234 is connected to a USB port of a computer.

[00125] A compartment (hidden from view in Figure 12) within the bottom compartment 1242 houses the cable (not shown) of the USB plug 1234 and the USB plug 1234.

[00126] A stopper pad 1258 is disposed on the bottom surface of the base 1102, specifically the bottom surface of the bottom case 1116. A panel 1260 houses the rubber pad 1258 secured to the bottom of the bottom case 1116. This stopper pad

1258 provides a frictional surface to prevent the hand massaging device 1100 from displacement during the massage. In the embodiment shown in Figure 12, the stopper pad 1258 may be made from rubber. Rubber blocks 1262 are used to cover screw holes on the bottom surface of the bottom case 1116.

[00127] Figures 13 and 14 are different perspective views of the hand massaging device 1100 of Figure 11.

[00128] The underside or bottom surface of the base 1102 can be clearly seen from Figures 13 and 14, which illustrates the location of a compartment 1336 within the base 1102, the compartment 1336 being for the housing of the USB plug 1234. The stopper pad 1258 can also be seen disposed on the bottom surface of the base 1102. A gap 1304 is provided at the underside of the base 1102 for coiling the USB plug cable (not shown). A second gap 1402 provided at the underside of the base 1102 is used to accommodate the USB plug cable when the USB plug cable is uncoiled for connecting the USB plug 1234 to a USB port of a computer. By having the USB plug cable engage with the second gap 1402, the base 1102 of the hand massaging device 1100 would rest fully on a table top without wobbling.

[00129] The following materials can be used to manufacture the hand massaging devices 100, 800, 900, 1000 and 1100 shown in Figures 1 to 14. Rigid plastic such as Acrylonitrile Butadiene Styrene (ABS), Polycarbonate (PC), Nylon, Polypropylene (PP), Polyphenylene Sulfide (PS), Amorphous Nylon (PA), can be used for the outer case (202, 1202), the inner case (204 1206), the lower case 214, the cover 1214 and the bottom case (216, 1116). Flexible material such as thermalplastic polyurethane(TPU), polyvinyl chloride (PVC), polypropylene, nylon and/or polyethylene (PF) can be used for the first massager (110, 810, 910, 1010 and 1110), the second massager (206, 1201), the third massager (220, 1220), the fourth massager 1205 and the fluid tubes (226, 1211, 1213). It is possible to use rigid plastic for the hand massaging devices 800 and 900, although using a resilient material would allow the hand massaging devices 800 and 900 to accommodate hands with different thickness. Rigid plastic can also be used for the hand massaging device 1000.

[00130] Figure 15 shows acupuncture points of the hand to illustrate the approximate locations of the various acupuncture points mentioned above. A brief description of the location and benefits of massaging several of the acupuncture points is provided below.

"Yangchi" Point

Location:

On the dorsal transverse wrist crease, between the tendons of muscles extensor digitorum and extensor digiti minimi.

Massage Therapy:

Dorsal wrist issues such as strains, sprains or subluxations.

Arm Pain - Deafness - Eye Disorders - Malaria - Mouth Dryness - Respiratory Disorders - Shoulder Pain - Thirst - Throat Infections - Throat Soreness - Wrist Joint Soft Tissue Diseases - Wrist Pain

"Hegu" Point

Location:

The crater of the junction between thumb and forefinger.

Massage Therapy:

Releases the exterior for wind-cold or wind-heat syndromes. Strengthens the wei qi, improves immunity.

Abdominal Pain - Amenorrhea - Arm Pain - Constipation - Deafness - Eye Deviation - Eye Disorders - Facial Edema - Facial Muscle Paralysis - Fever Without Sweating - Finger Contraction - Headache - Hemiplegia - Intestinal Disorders - Labor Difficult - Mouth Deviation - Nosebleed - Parotitis - Respiratory Disorders - Skin Disorders - Throat Soreness - Toothache

"Taiyuan" Point

Location:

On the lateral side of the anterior wrist crease, in the depression on the radial side of the radial artery.

Massage Therapy:

Tonifies The Lung, promotes Lung Descending Function, regulates and harmonizes The One Hundred Vessels, activates The Channel , transforms phlegm, alleviates pain

Asthma - Chest Pain - Cough - Coughing Blood - Dyspnea - Eye Disorders - Forearm Medial Pain - Headache - Palpitations - Respiratory Disorders - Throat Soreness - Toothache - Wrist Joint Soft Tissue Diseases - Wrist Pain

"Shenmen" Point

Location:

On the transverse wrist crease, in the small depression between the pisiform and ulna bones.

Massage Therapy:

Tonify deficiencies of the HT Qi, blood, Yin and Yang. Emotional issues, especially those with related sleep or thinking manifestations - insomnia, muddled thinking.

Cardiac Pain - Depression - Dream Disturbed Sleep - Eyes Yellow - Hypochondriac Region Pain - Hysteria - Insomnia - Irritable - Loss Of Voice - Memory Impaired - Mental Disorders - Palm Heat - Palpitations - Seizures - Thirst - Throat Dryness

"Daling" Point

Location:

At the transverse wrist crease, between the tendons of palmaris longus and flexor carpi radialis muscles.

Massage Therapy:

Cooling heat that is effecting the heart of a deficient or excess nature. Clears Ying and blood heat, fever deep in the body that is drying up fluids.

Cardiac Conditions - Cardiac Pain - Chest Pain - Coughing Blood - Eructations - Fear - Gastrointestinal Disorders - Hypochondriac Region Pain - Insomnia - Mental Disorders - Palm Heat - Palpitations - Seizures - Skin Disorders - Stomach Pain - Throat Infections - Vomiting - Wrist Pain

[00131] Figure 16 shows a cross-sectional view of the hand massaging device 1100 of Figure 11. From Figure 16, it can be observed that the central protrusion 1264a of the vibrator 1217 provides a massaging surface area that is wide enough to accommodate the palm of a hand to be massaged. The central protrusion 1264a is larger compared to the protrusions 1264b. Figure 16 also shows the locations of the first massager 1110, the second massage 1201, the third massager 1220 and the fourth massager 1205.

[00132] Figures 17 to 20 show various air bags that may be used for any one or more of the first massager, the second massager, the third massager and the fourth massager of embodiments of the invention.

[00133] In Figure 17A, the air bag 1700 includes a first monolithic layer 1712 and a second monolithic layer 1714. The first and second monolithic layer 1712 and 1714 are attached to each other along a closed line 1715 that runs all around in a substantially elliptical shape. The first and second monolithic layers 1712 and 1714, along with the closed line 1715, define a fluid chamber (shown as reference numeral 1711 in Figure 17B). The air bag 1700 includes a fluid port 1716 that is in fluid communication with the fluid chamber.

[00134] The first monolithic layer 1712, within the closed line 1715, is at least substantially corrugated in shape while the second monolithic layer within the closed line 1715 (though not shown) is substantially planar. The corrugation of the first monolithic layer 1712 is made up of ridges and grooves or waveforms. As illustrated, the corrugations are concentric, extending from a plateau in the central region of the closed line 1715, towards the closed line 1715. As such, the total corrugated surface area of the first monolithic layer 1712 within the closed line 1715 is larger than that of the second monolithic layer 1714.

[00135] Figure 17B shows a cross-sectional view about the line Y-Y of Figure 17A. In Figure 17B the first monolithic layer 1712 and the second monolithic layer 1714 are attached to each other along the closed line 1715. Within the closed line 1715, the first and second monolithic layers 1712 and 1714 have overlapping surfaces wherein the surface area of the first monolithic layer 1712 is larger than that of the second monolithic layer 1714. The larger surface area of the first monolithic

layer 1712 is maintained within the closed line 1715 by corrugating the surface of the first monolithic layer 1712, i.e. it is shaped from a plurality of ridges and grooves (or waveforms) 1713. The corrugated first monolithic layer 1712 and the second monolithic layer 1714, along with the closed line 1715, define the fluid chamber 1711. When the fluid chamber 1711 is in its deflated state, the first monolithic layer 1712 rests on the second monolithic layer 1714 as shown.

[00136] Figure 18A shows the embodiment of Figure 17A in an inflated state. In the inflated state, the first monolithic layer 1712 no longer appears corrugated as fluid (such as air) fills the fluid chamber 1711 thereby forcing the expansion of the corrugated surface of the first monolithic layer 1712 into a substantially parabolic shape with the plateau. The inflated state of the air bag is better illustrated in Figure 18B which shows a cross-sectional view about the line Y-Y of the embodiment of Figure 18A. In this embodiment, although the first monolithic layer 1712 is substantially parabolic, the second monolithic layer 1714 is essentially planar thereby giving rise to a substantially dome-shaped structure.

[00137] Alternatively, the second monolithic layer 1714 may be adapted such that it adopts a parabolic shape as well when the air bag 1710 is inflated thereby giving rise to a more circular structure (not shown) when viewed from its cross-sectional area about the line Y-Y. In addition, although in the illustrated embodiment, the first monolithic layer 1712 is shown not to extend outside the closed line 1715, it is to be noted that the area of the monolithic layers 1712 and 1714 outside of the closed line 1715 may vary. However, the relationship within the closed line between the monolithic layers 1712 and 1714 remains the same in that the surface area of the first monolithic layer 1712 always exceeds that of the second monolithic layer 1714, with the excess being maintained within the closed line 1715 by way of the first monolithic layer 1712 being corrugated in shape, when the air bag is deflated.

[00138] Figure 19A shows another embodiment of an air bag 1920 according to the present invention in a deflated state. The embodiment of Figure 19A is similar to that of Figure 18A with the exception being that the air bag 1920 of Figure 19A is arranged within a recess or cup 1918 (as shown in Figure 19B). Accordingly, as in Figure 19A, the first monolithic layer 1912 and the second monolithic layer 1914 are

attached to each other along a closed line 1915 that runs all around in a substantially elliptical shape. The first and second monolithic layers 1912 and 1914, along with the closed line 1915 define the fluid chamber 1911 (shown in Figure 19B) and the fluid chamber is in fluid communication with the fluid port 1916.

[00139] As the air bag 1920 illustrated in Figure 19A is arranged within the recess 1918, the second monolithic layer 1914 tends to adopt the shape of the recess 1918. Alternatively, the second monolithic layer 1914 may be pre-formed to the shape of the recess 1918 to facilitate the assembly of the air bag 1920 within the recess 1918. In any case, as in the embodiment of Figure 19A, the surface area of the first monolithic area 1912 within the closed line 1915 exceeds that of the second monolithic layer 1914. Accordingly, the larger surface area of the first monolithic layer 1912 is maintained within the closed line 1915 by having said surface area shaped into a plurality of waveforms 1913, as shown in Figure 19B, which is a cross-sectional view about the line X-X of the embodiment of Figure 19A. The waveforms 1913 rest on the second monolithic layer 1914 when the air bag 1920 is in its deflated state and expand outwards, or unfold when air is pumped into the fluid chamber 1911.

[00140] Figure 20A shows the embodiment of Figure 19A in an inflated state. As in Figure 18A and Figure 18B, the first monolithic layer 2012 no longer retains its waveform as fluid (such as air) fills the fluid chamber 2011 thereby forcing the expansion of the waveform of the first monolithic layer 2012 into a substantially parabolic shape with the plateau. The inflated state of the air bag 2020 is better illustrated in Figure 20B which shows a cross-sectional view about the line X-X of the embodiment of Figure 20A. In this embodiment, although the first monolithic layer 2012 is substantially parabolic, the second monolithic layer 2014 is essentially planar thereby giving rise to a dome-shaped structure.

[00141] Unlike the embodiment of Figure 18B, due to the placement of the air bag 2020, specifically, the second monolithic layer 2014, within the recess 2018, the air bag 2020 is constrained by the size and shape of the rigid recess 2018 and thus, forms a dome-shape where the second monolithic layer 2014 is at least substantially

planar while the first monolithic layer 2012 is substantially parabolic with the plateau.

CLAIMS

1. A hand massaging device comprising

a base;

a top opposite the base;

a wall connecting the base to the top, wherein the base, the top and the wall enclose a space accessible via an opening, the space adapted to accommodate a hand or fingers of the hand to be massaged; and further comprising

a first massager disposed on or above the base, the first massager designed to provide a massage to the hand or fingers of the hand when the hand or fingers of the hand is placed within the space and the first massager is activated.

2. The hand massaging device of claim 1, wherein the first massager is designed to massage the palm surface of the hand or fingers of the hand.

3. The hand massaging device of claims 1 or 2, wherein the first massager comprises any one or more of an inflatable chamber, an electrode or a roller.

4. The hand massaging device of claim 3, where the inflatable chamber has a surface comprising

an arrangement of protruding concentric rings; and

a protrusion formed in the centre of the protruding concentric rings.

5. The hand massaging device of any one of the preceding claims, further comprising

a further wall connecting the base to the top, wherein the base, the top, the wall and the further wall enclose the space adapted to accommodate the hand or fingers of the hand to be massaged.

6. The hand massaging device of claim 5, wherein the wall and the further wall are spaced apart to form a further opening between the wall and the further wall, the further

opening located opposite to the opening, so that when the space accommodates the hand, the fingers of the hand protrude beyond the further opening.

7. The hand massaging device of any one of the preceding claims, further comprising a second massager extending from an interior surface of the wall to part of an interior surface of the top, the second massager designed to provide a massage to an area of the hand ranging from the first web space to a portion of the dorsal.

8. The hand massaging device of claim 7, wherein the second massager comprises any one or more of an inflatable chamber, an electrode or a roller.

9. The hand massaging device of claim 8, where the inflatable chamber has a surface comprising

an arrangement of protruding concentric rings; and

a protrusion formed in the centre of the protruding concentric rings.

10. The hand massaging device of claims 5 to 9, further comprising a third massager extending from an interior surface of the further wall to part of an interior surface of the top, the third massager designed to provide a massage to an area of the hand ranging from the hypothenar eminence to a portion of the dorsal.

11. The hand massaging device of claim 10, wherein the third massager comprises any one or more of an inflatable chamber, an electrode or a roller.

12. The hand massaging device of claim 11, where the inflatable chamber has a surface comprising

an arrangement of protruding concentric rings; and

a protrusion formed in the centre of the protruding concentric rings.

13. The hand massaging device of any one of the preceding claims, further comprising a fourth massager, disposed on or below the bottom surface of the top,

wherein the fourth massager is designed to provide a massage to the dorsal surface of the hand.

14. The hand massaging device of claim 13, wherein the fourth massager comprises any one or more of an inflatable chamber, an electrode or a roller.

15. The hand massaging device of claim 14, where the inflatable chamber has a surface comprising

an arrangement of protruding concentric rings; and

a protrusion formed in the centre of the protruding concentric rings

16. The hand massaging device of any one of the preceding claims, further comprising a vibrator disposed on or above the base.

17. The hand massaging device of claim 16, wherein the vibrator comprises one or more protrusions.

18. The hand massaging device of claim 17, wherein the one or more protrusions comprise a central protrusion and two protrusions disposed adjacent to the central protrusion, the central protrusion being larger than the two protrusions.

19. The hand massaging device of any one of the preceding claims, further comprising an activator adapted to operate the first massager.

20. The hand massaging device of claim 19, wherein the activator comprises any one or more of the following components: an air pump, an electromagnetic valve or solenoid, an amplifier or a motor.

21. The hand massaging device of claims 19 or 20, wherein the activator is further adapted to operate the first, the second, the third and the fourth massagers.

22. The hand massaging device of claims 19 to 21, further comprising a noise suppressing unit coupled to the activator.

23. The hand massaging device of claim 22, wherein the noise suppressing unit comprises a sponge.

25. The hand massaging device of any one of the preceding claims, further comprising a layer of sponge disposed so as to surround the space enclosed by the base, the top and the wall.

26. The hand massaging device of any one of the preceding claims, further comprising a stopper pad disposed on the bottom surface of the base.

27. The hand massaging device of claim 26, wherein the stopper pad comprises rubber.

28. The hand massaging device of claims 16 to 27, further comprising

a processor to control the massaging operation of the first massager, the second massager, the third massager, the fourth massager and the vibrator.

29. The hand massaging device of claim 28, further comprising a cable with a USB plug for connecting to a USB port of a computer to power the processor.

30. The hand massaging device of claim 29, further comprising a compartment within the base to house the cable and the USB plug.

31. The hand massaging device of claims 16 to 30, further comprising a conformable layer disposed between the vibrator and the first massager.

32. The hand massaging device of claim 31, wherein the conformable layer comprises a layer of foam.

33. The hand massaging device of any one of the preceding claims, further comprising a compartment to house a power source.

34. The hand massaging device of claim 33, wherein the power source may comprise any one or more of the following batteries, externally connected batteries or a port adapted to be powered by a wall socket.

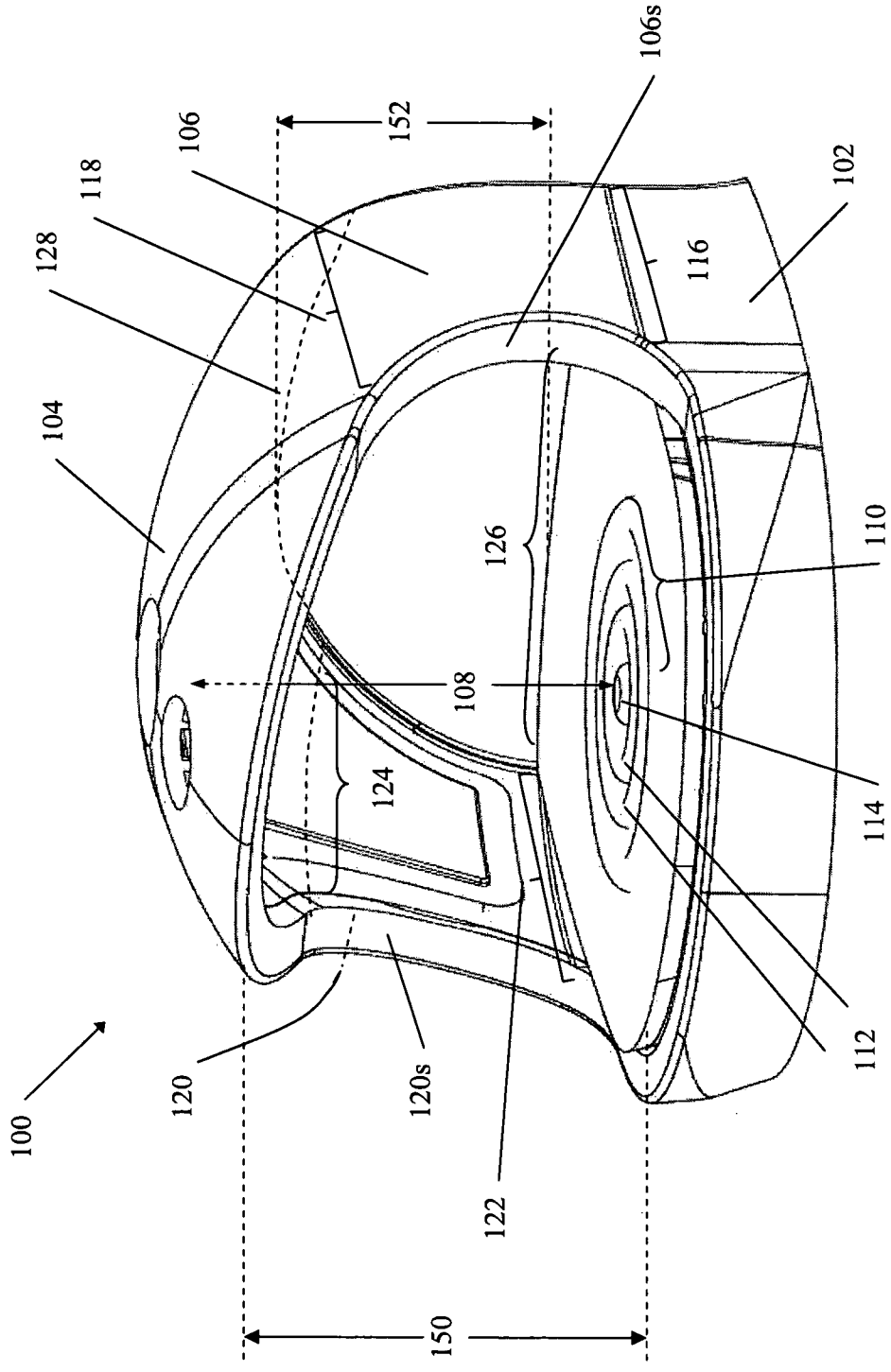
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Figure 1A

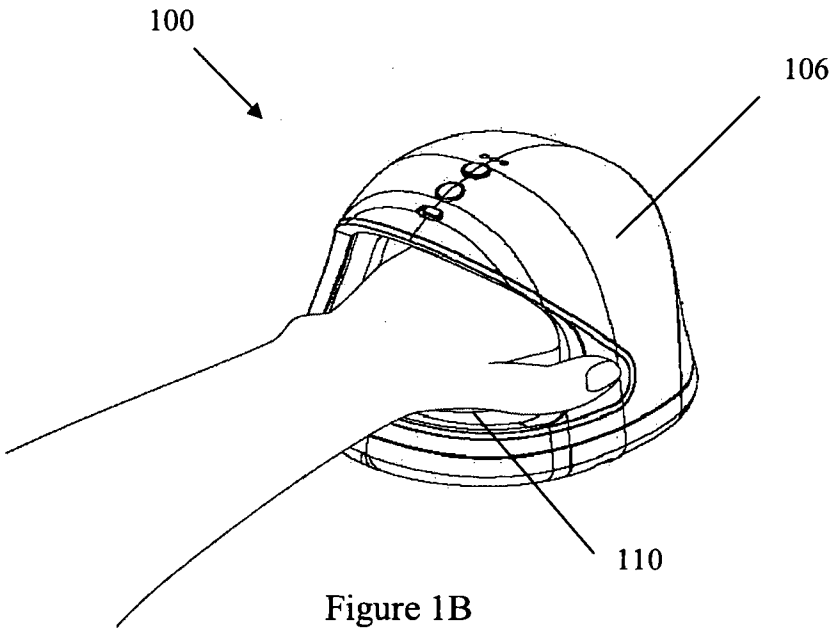

Figure 1B

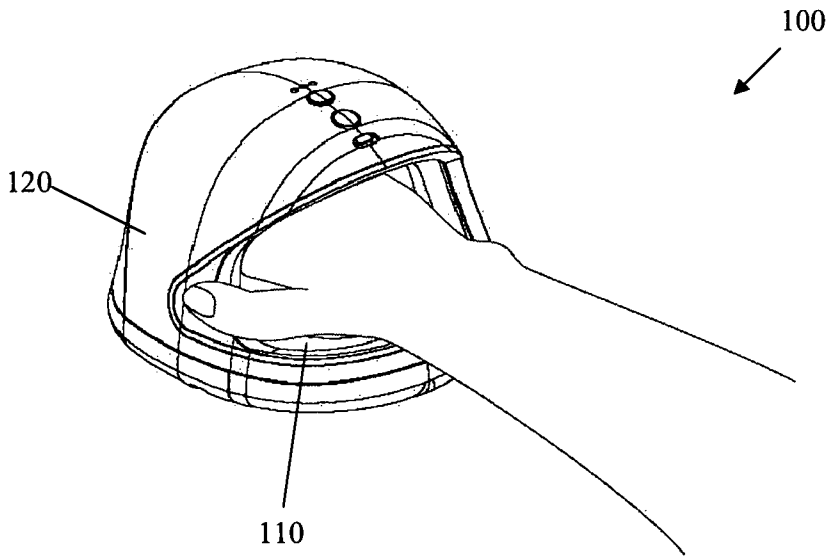

Figure 1C

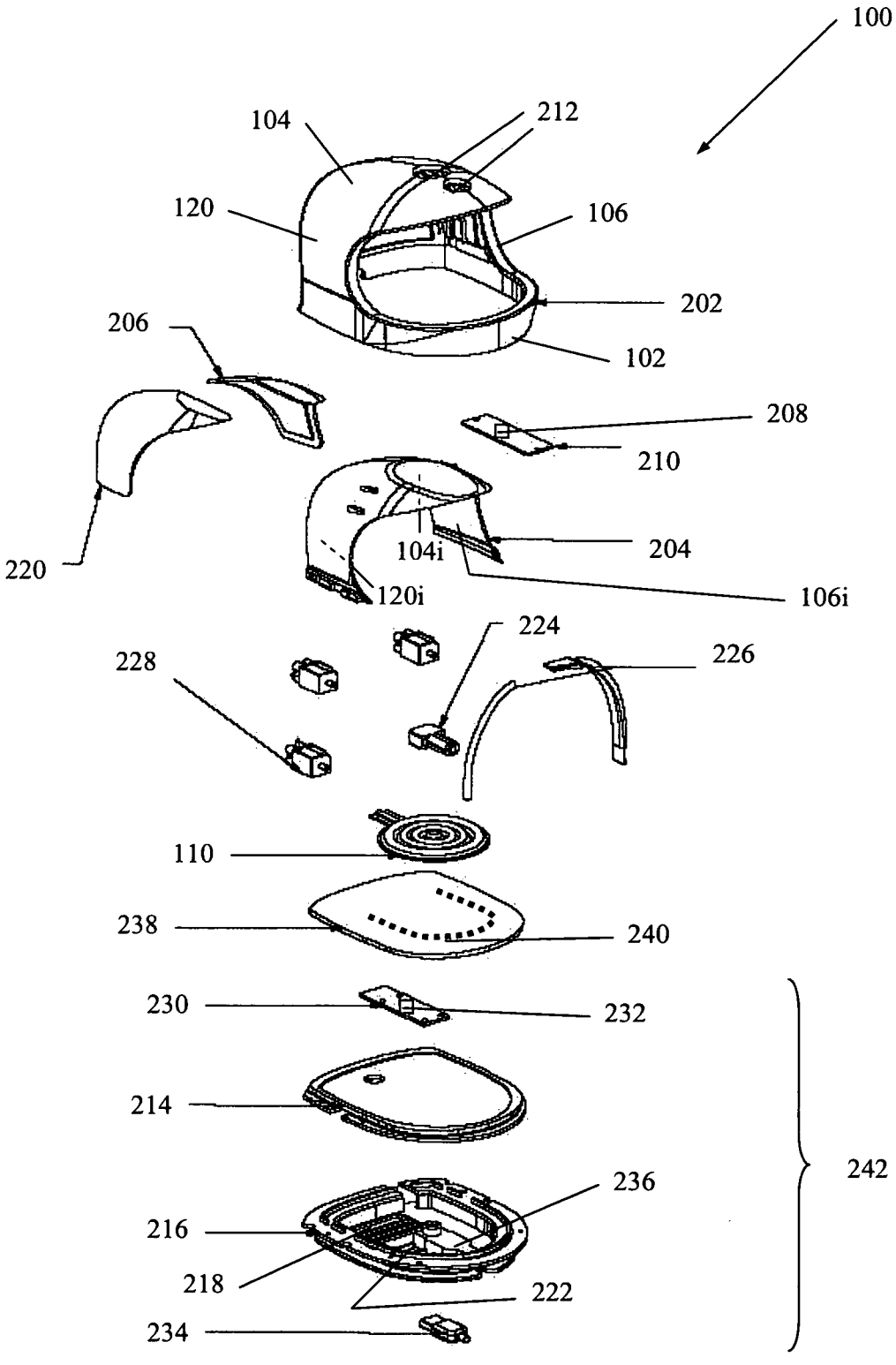
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Figure 2

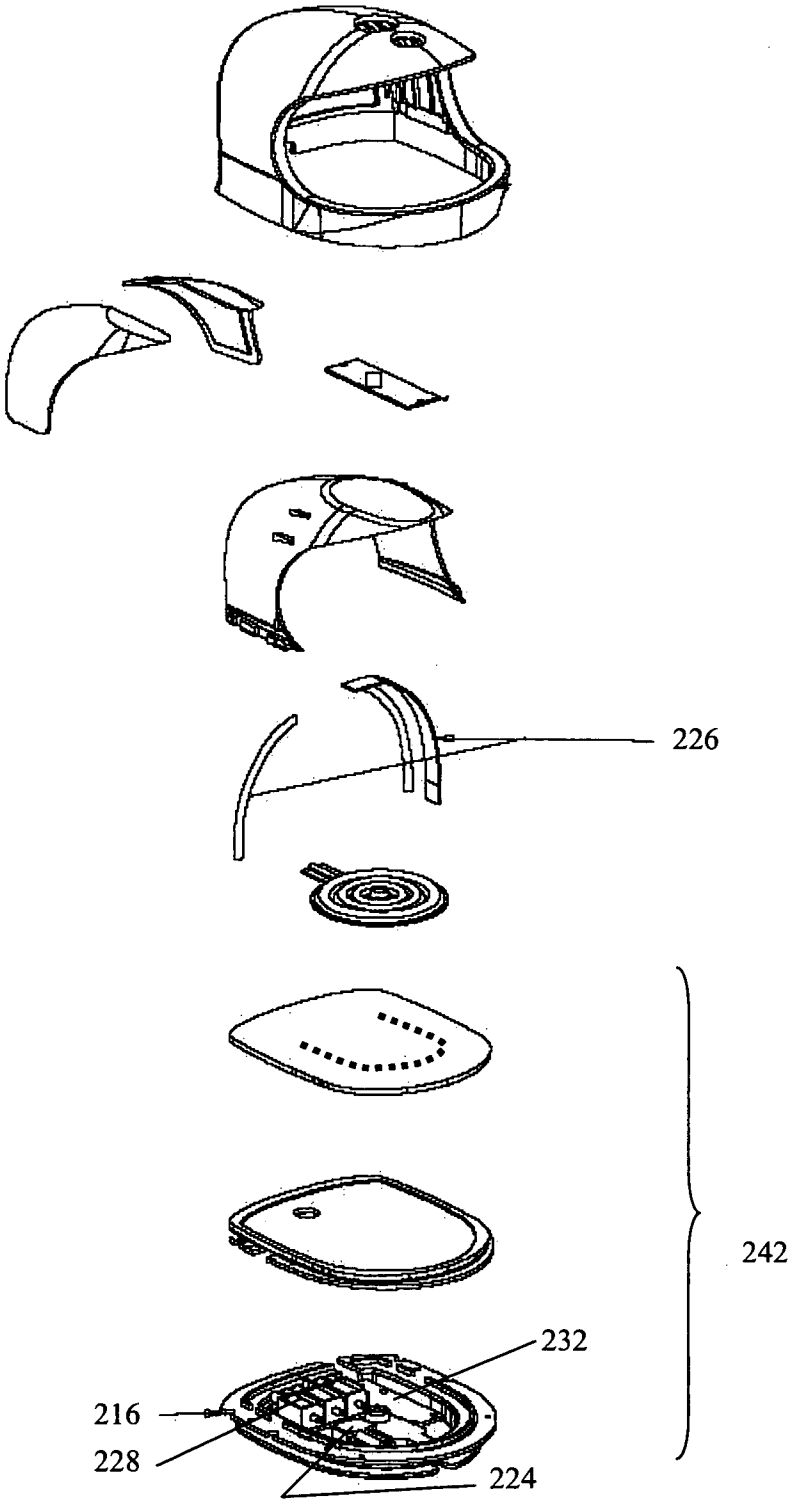

Figure 3

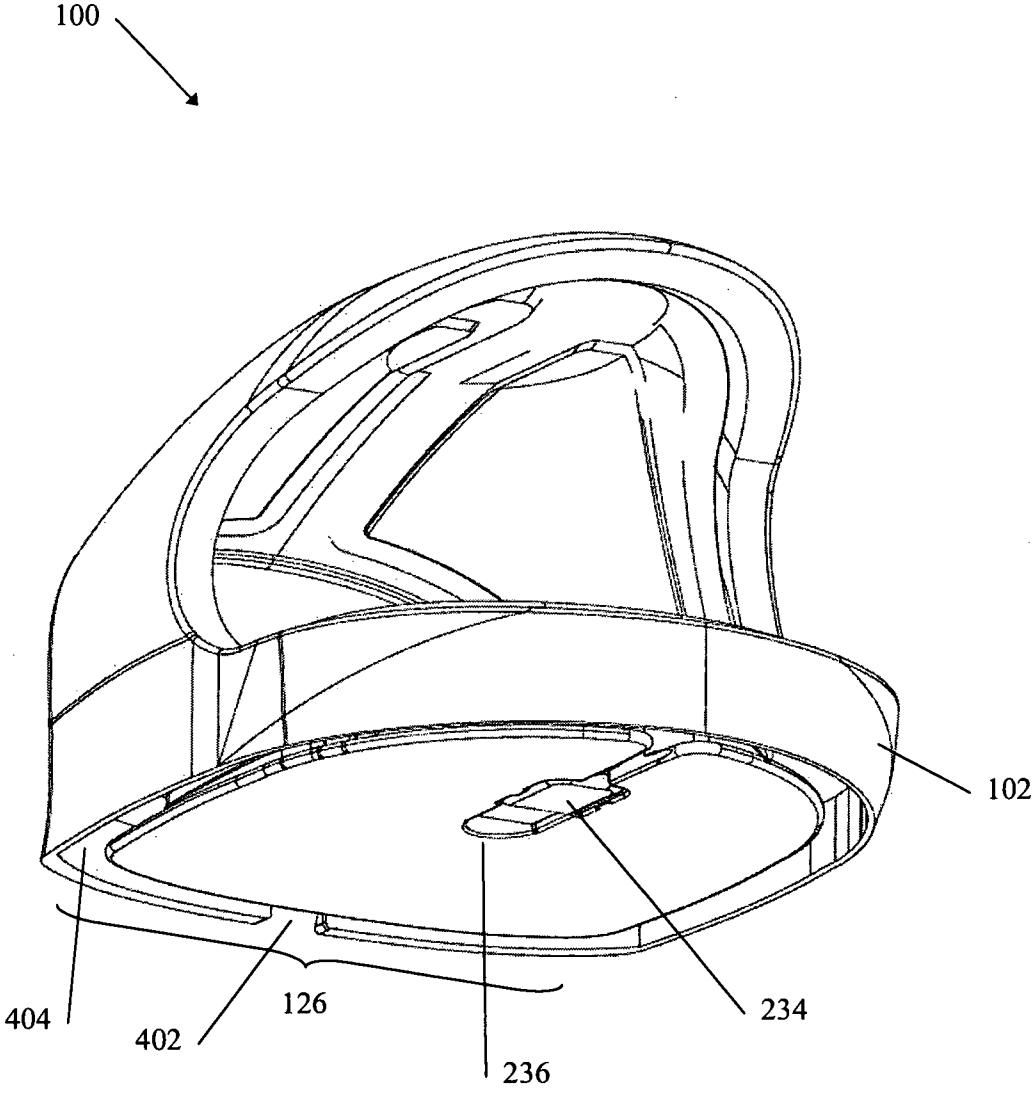

Figure 4

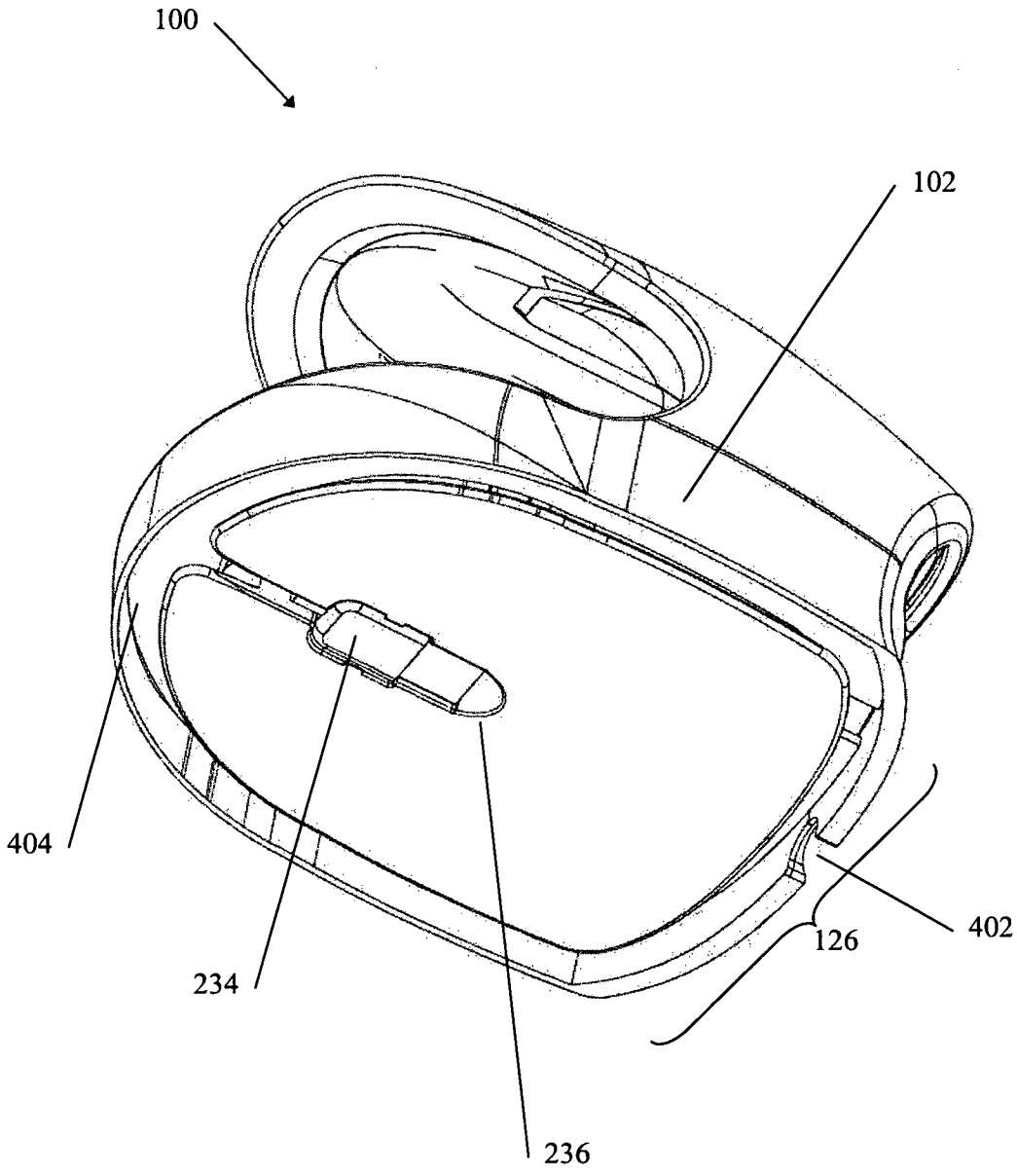

Figure 5

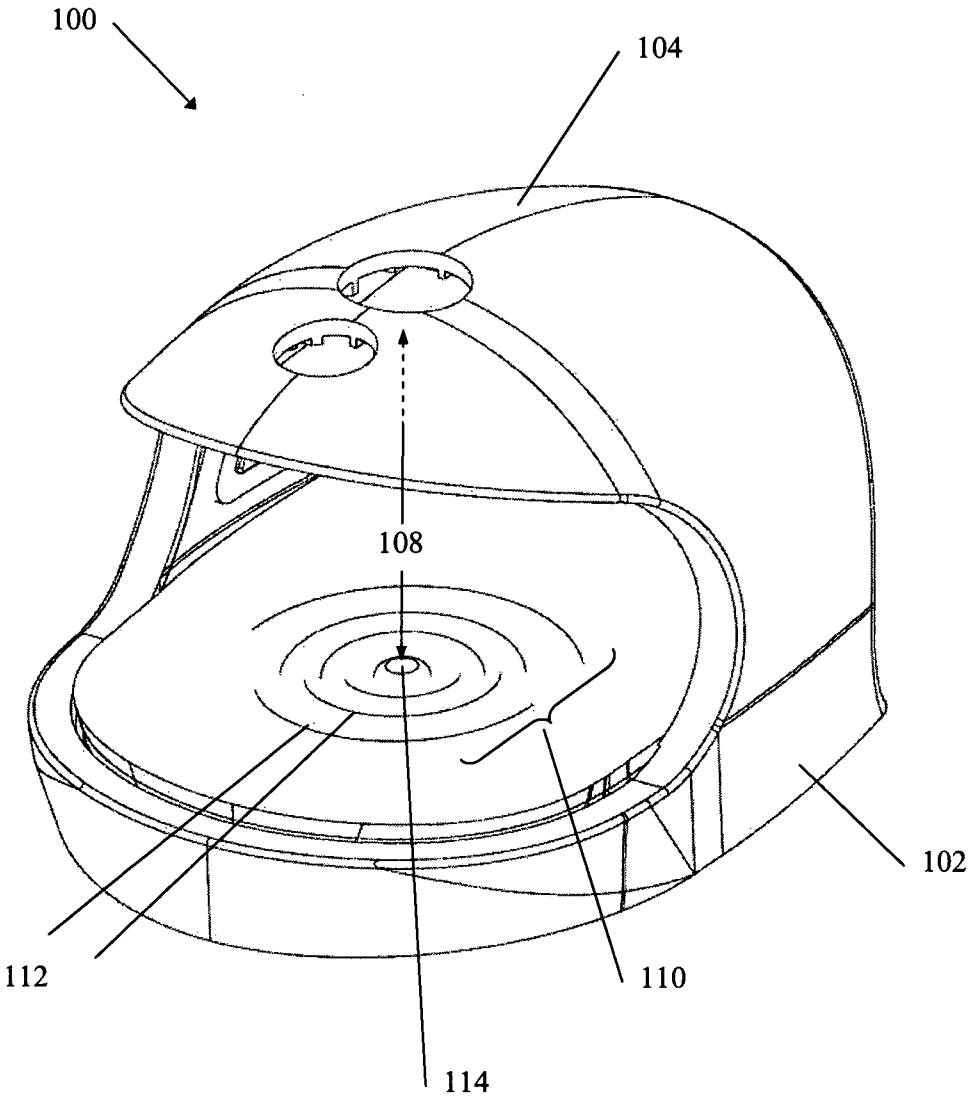

Figure 6

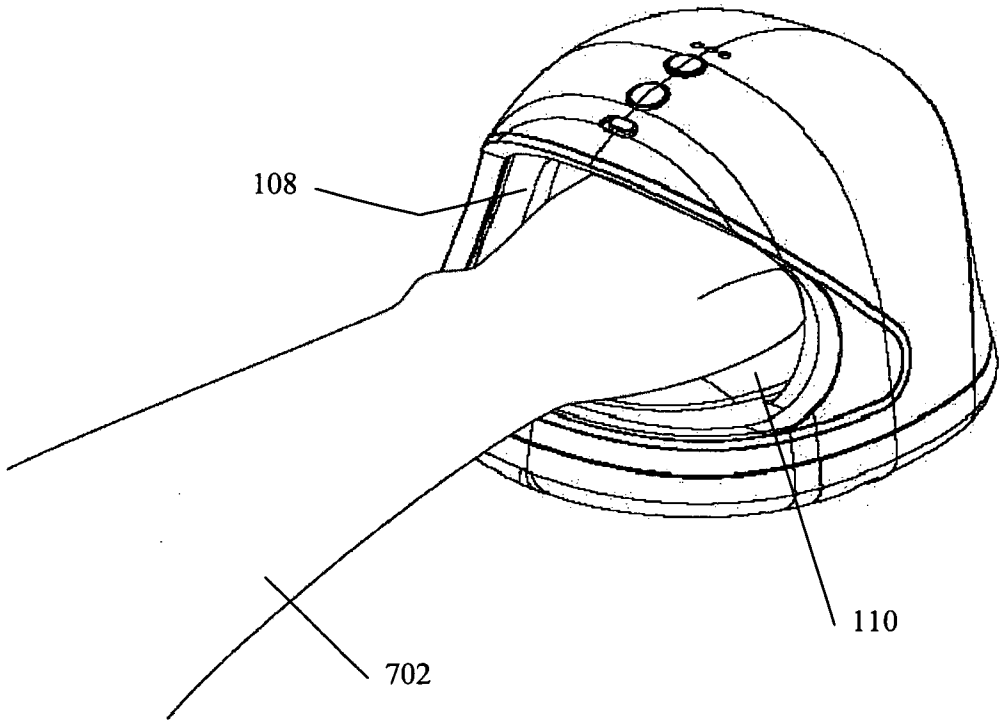

Figure 7

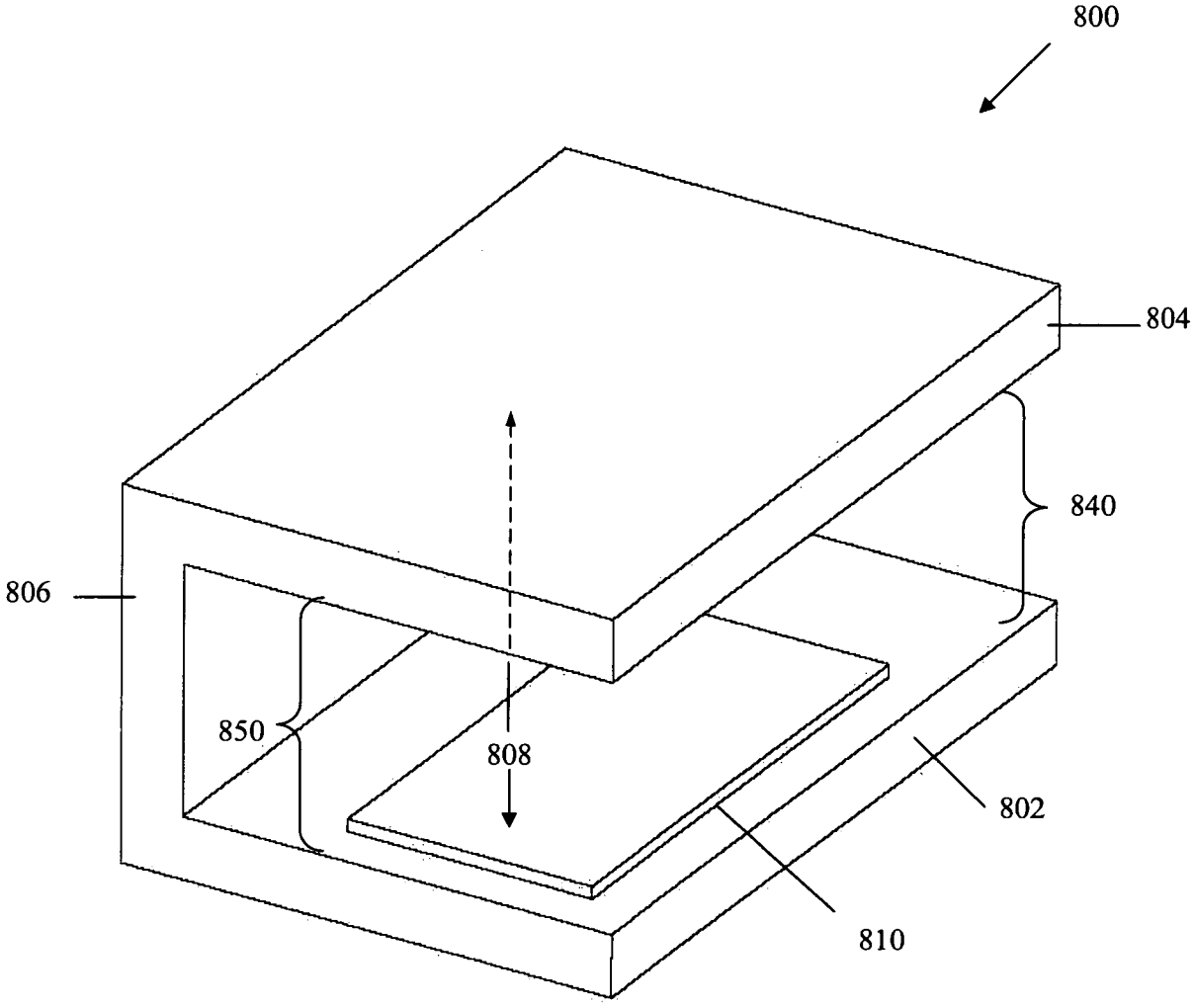

Figure 8

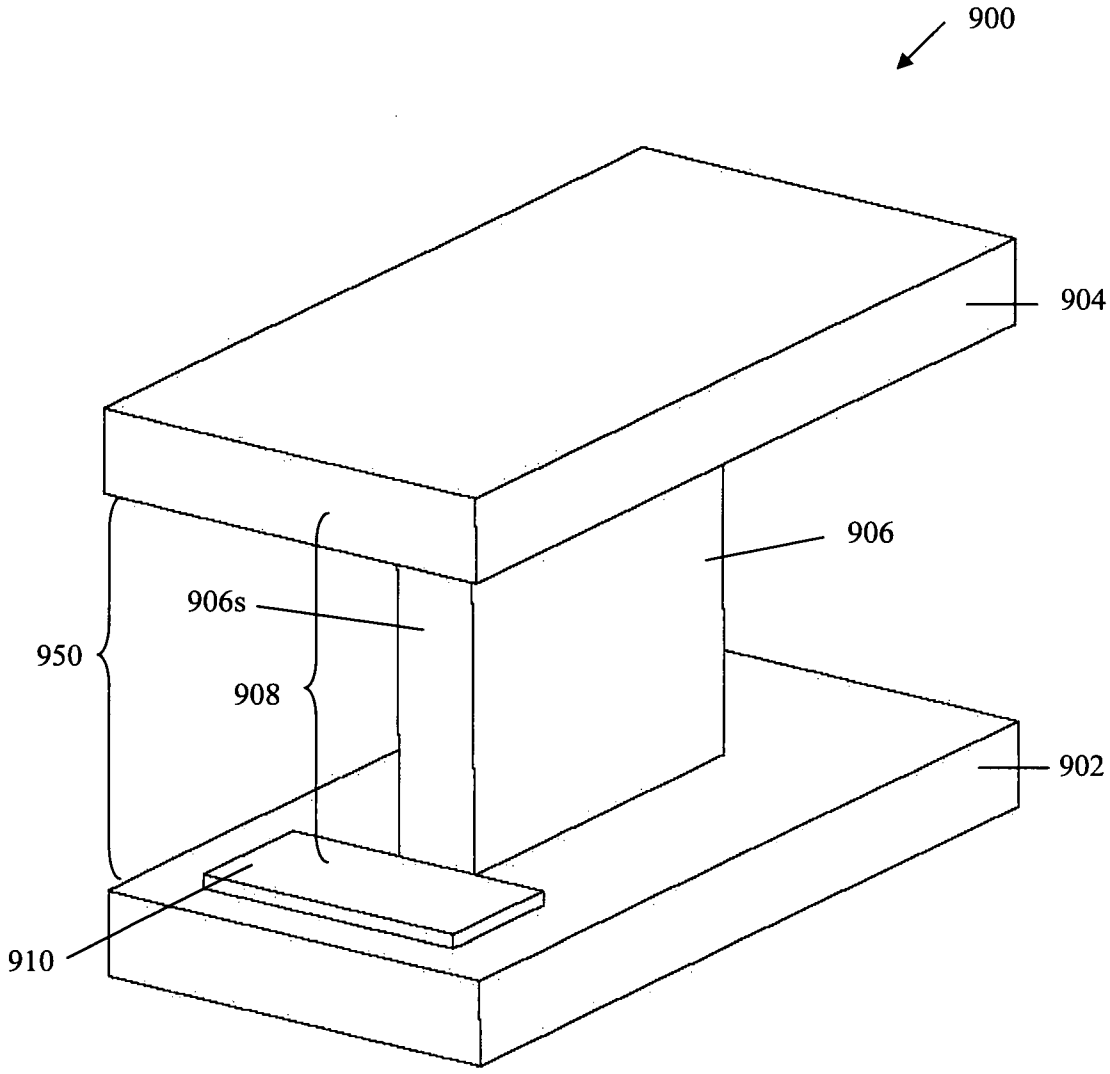

Figure 9

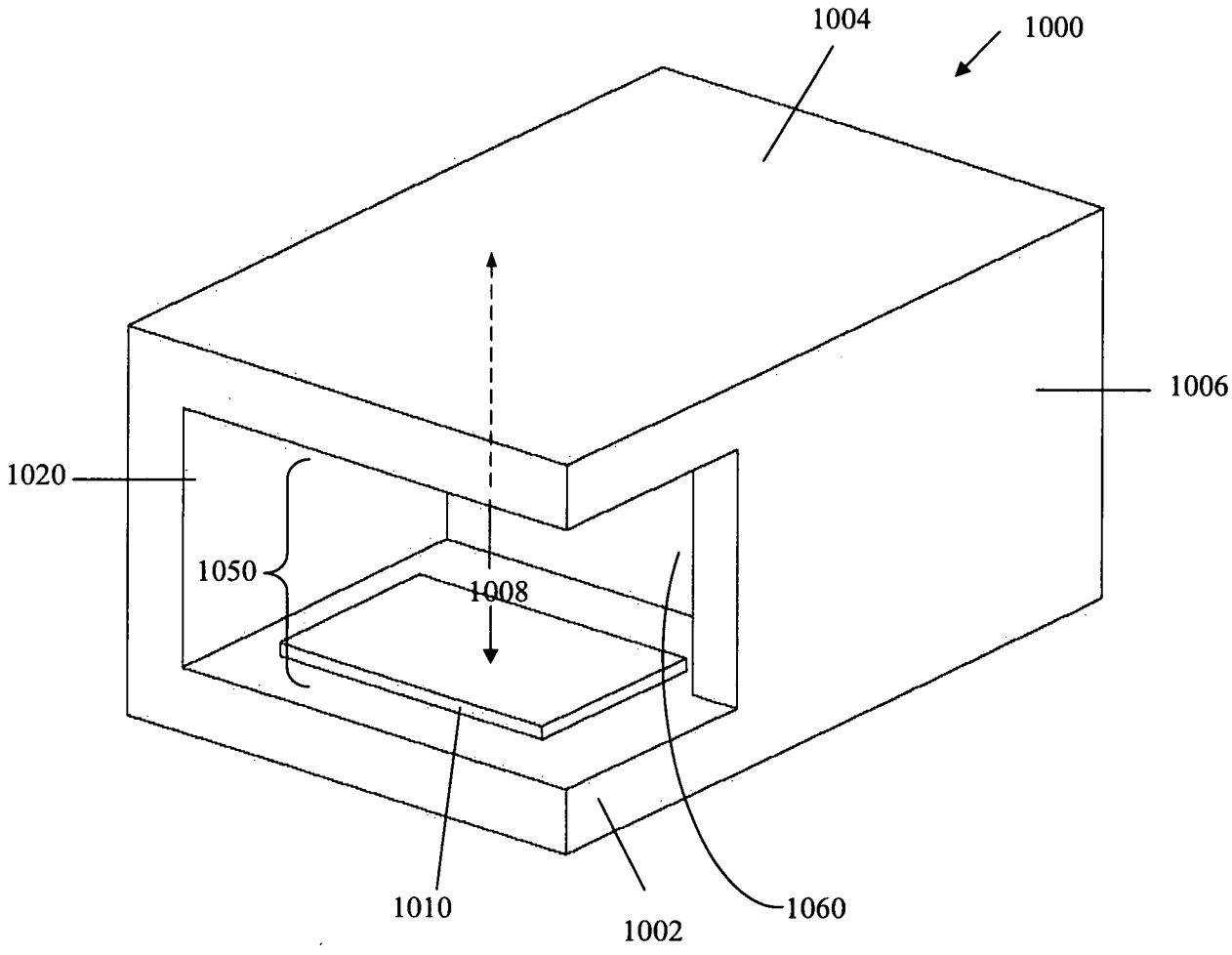

Figure 10

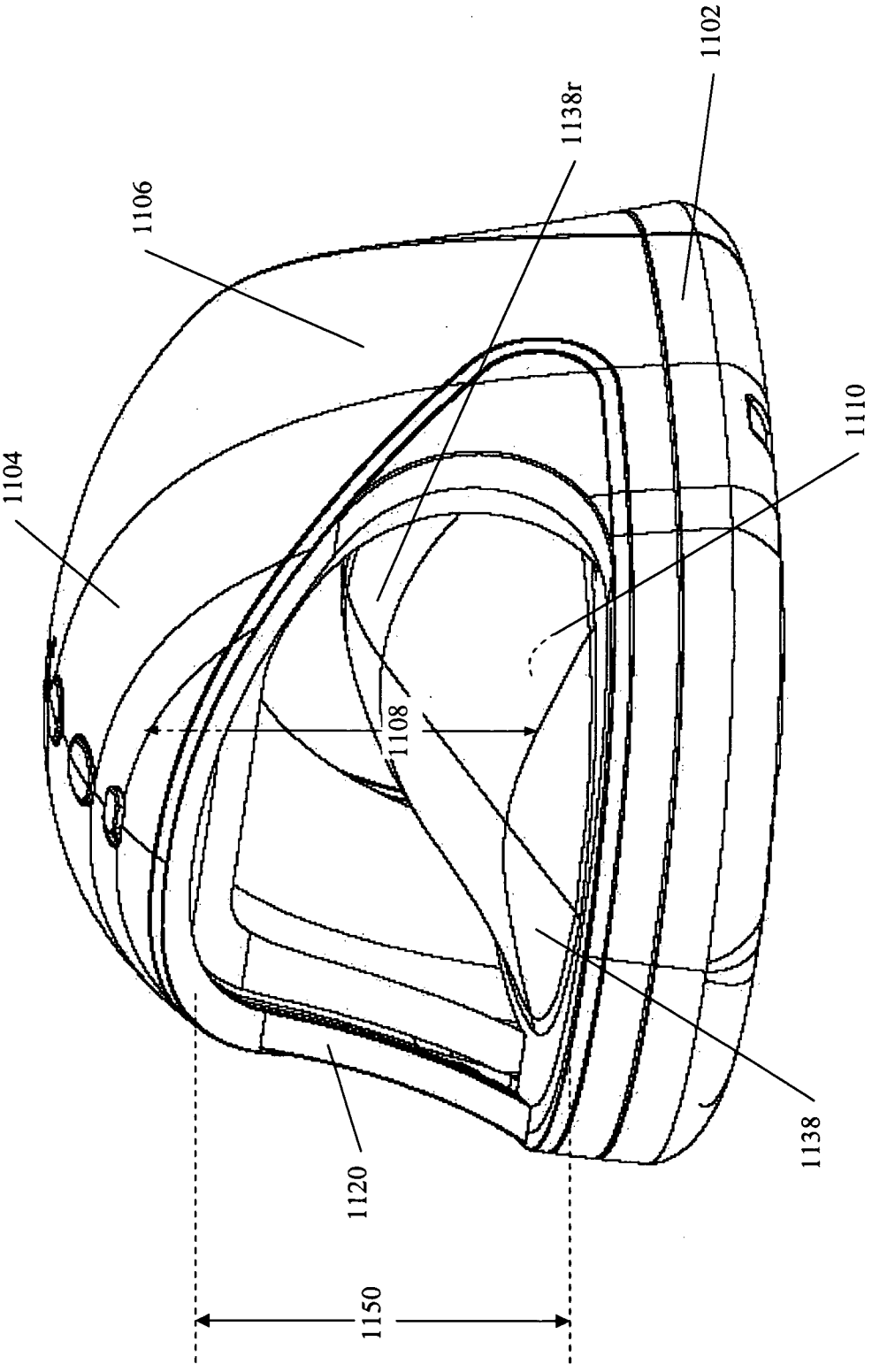

Figure 11

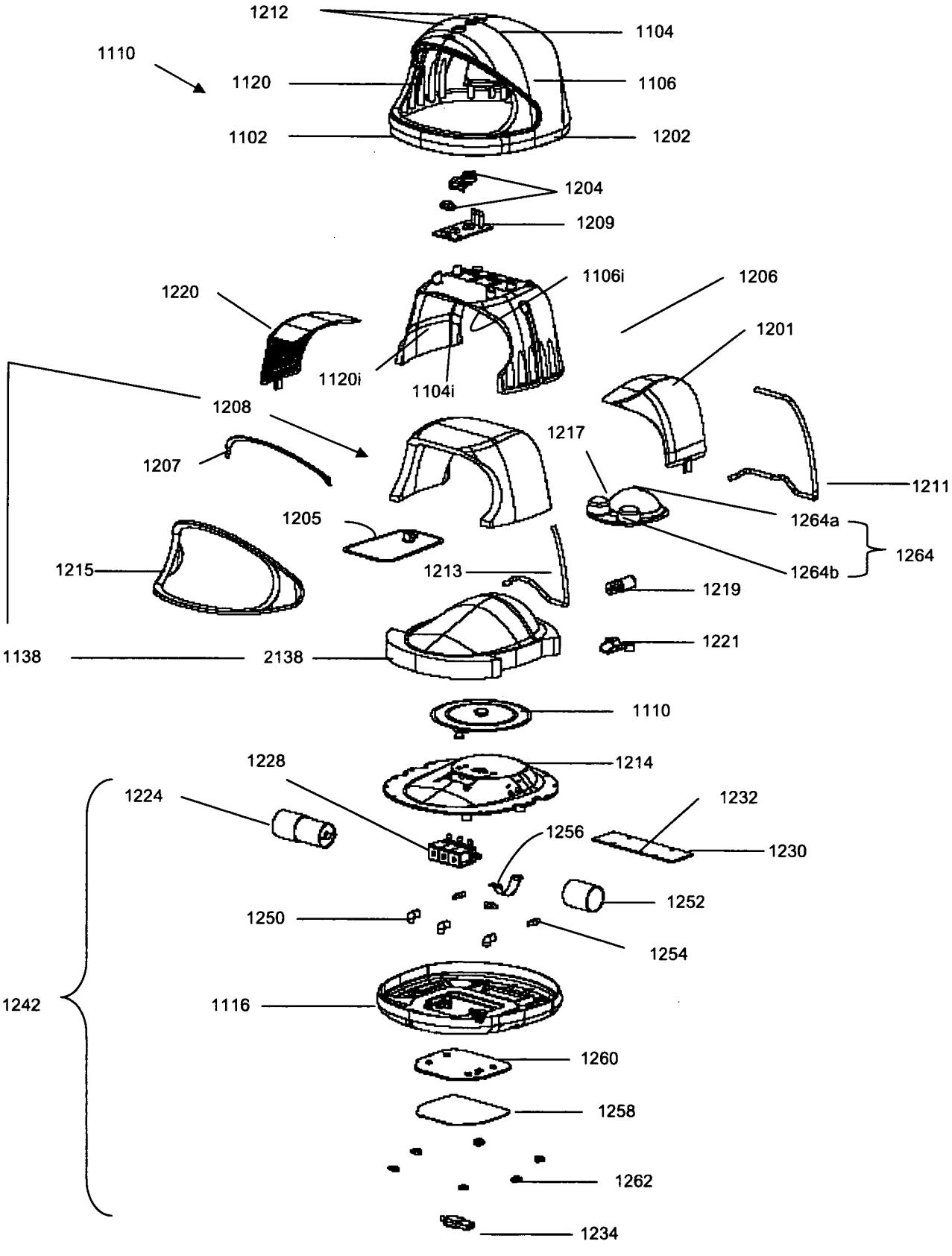
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Figure 12

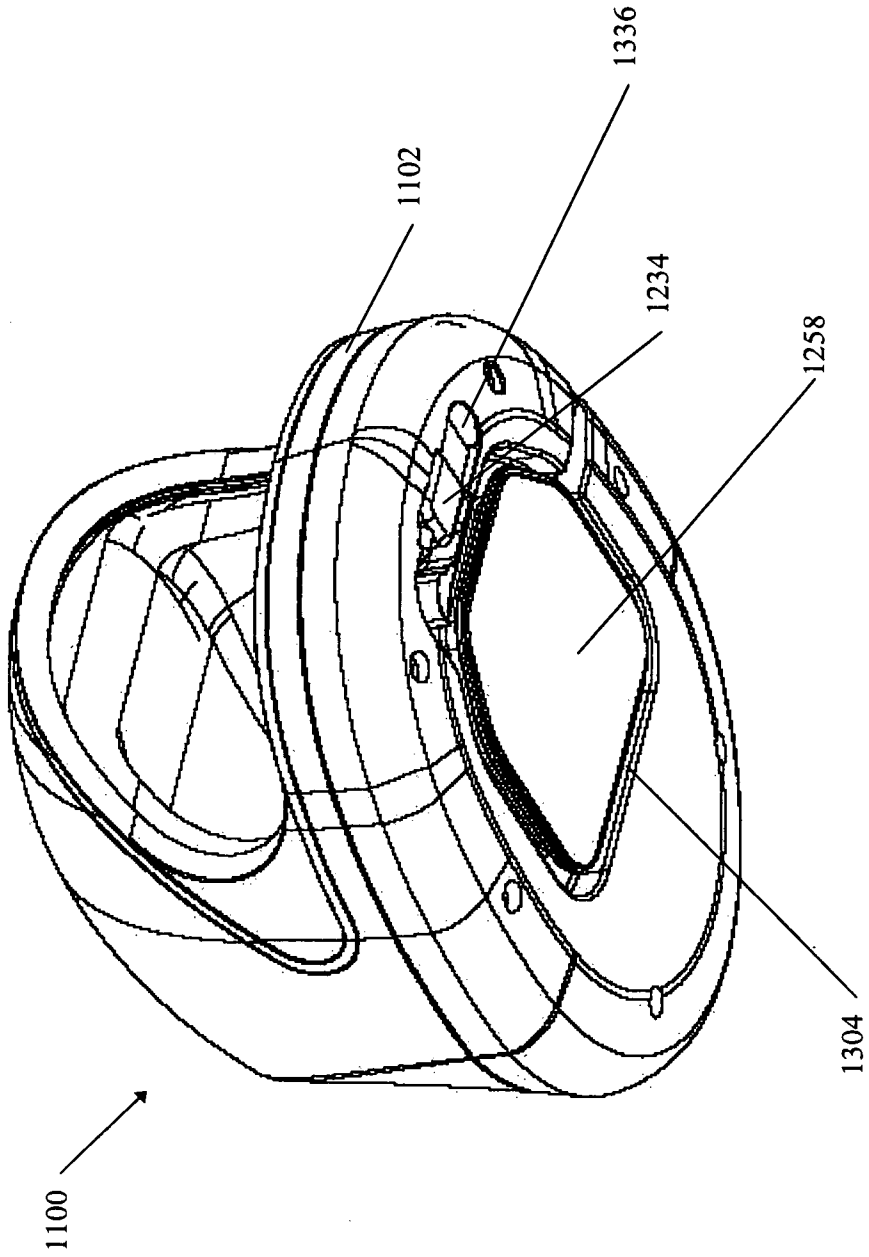


Figure 13

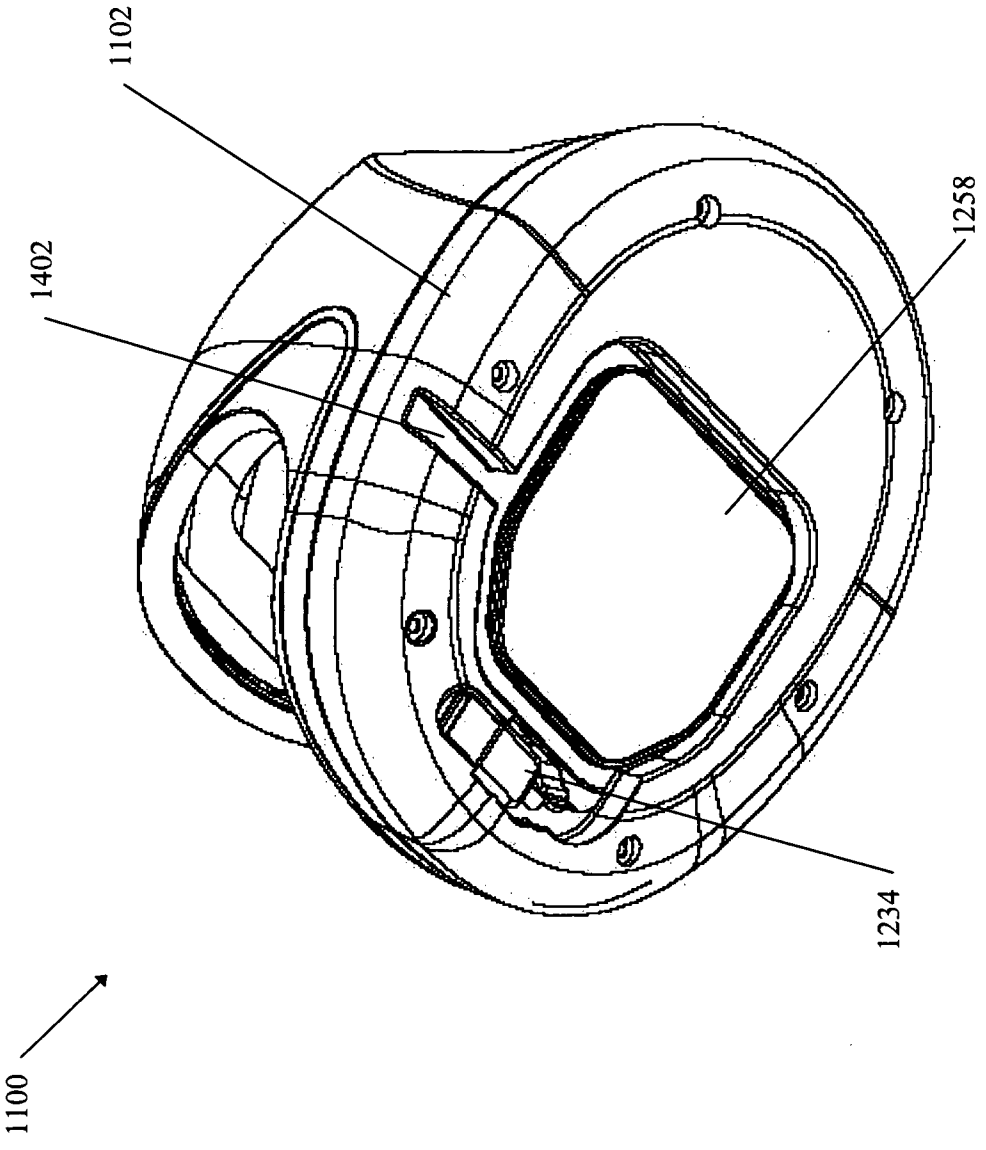
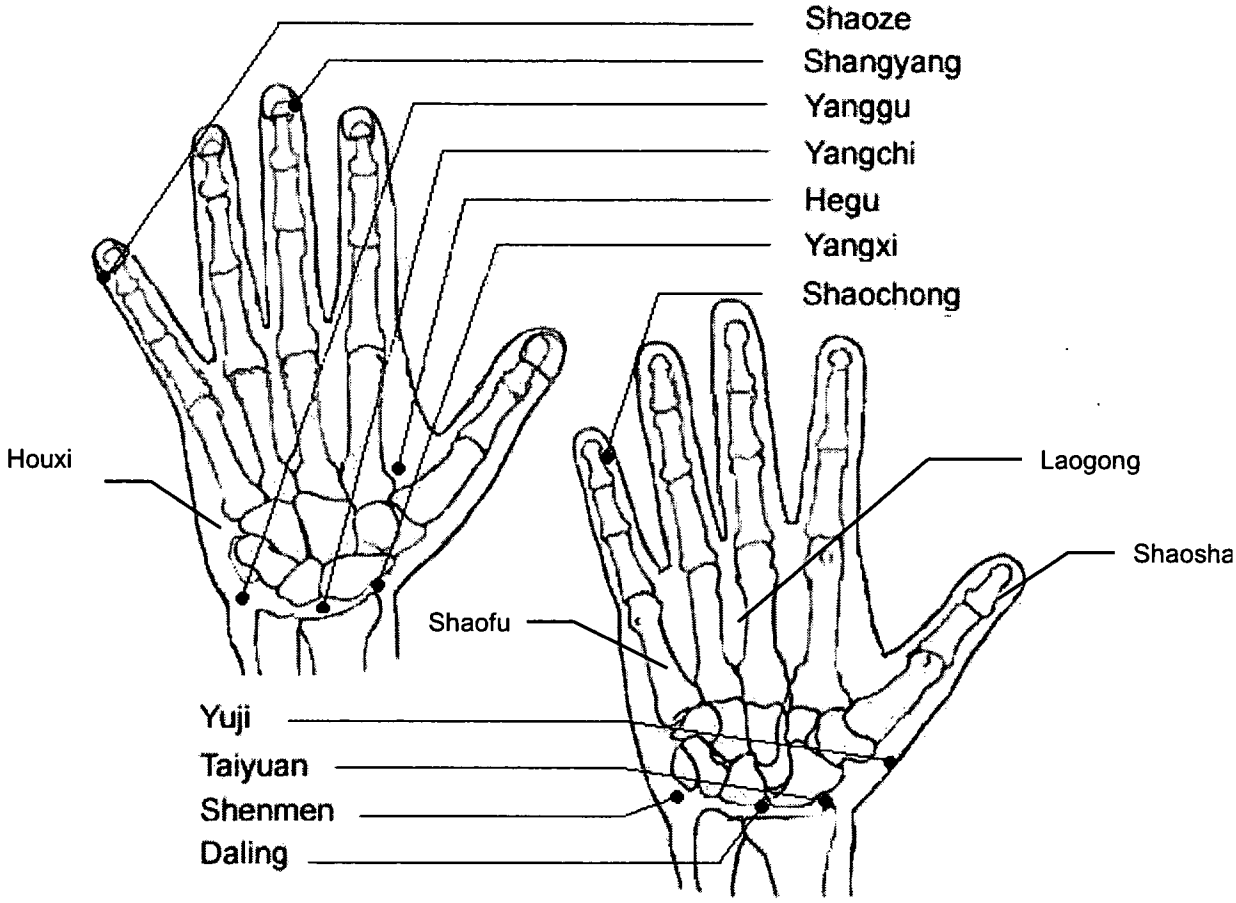


Figure 14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Yuji
Taiyuan
Shenmen
Daling

Figure 15

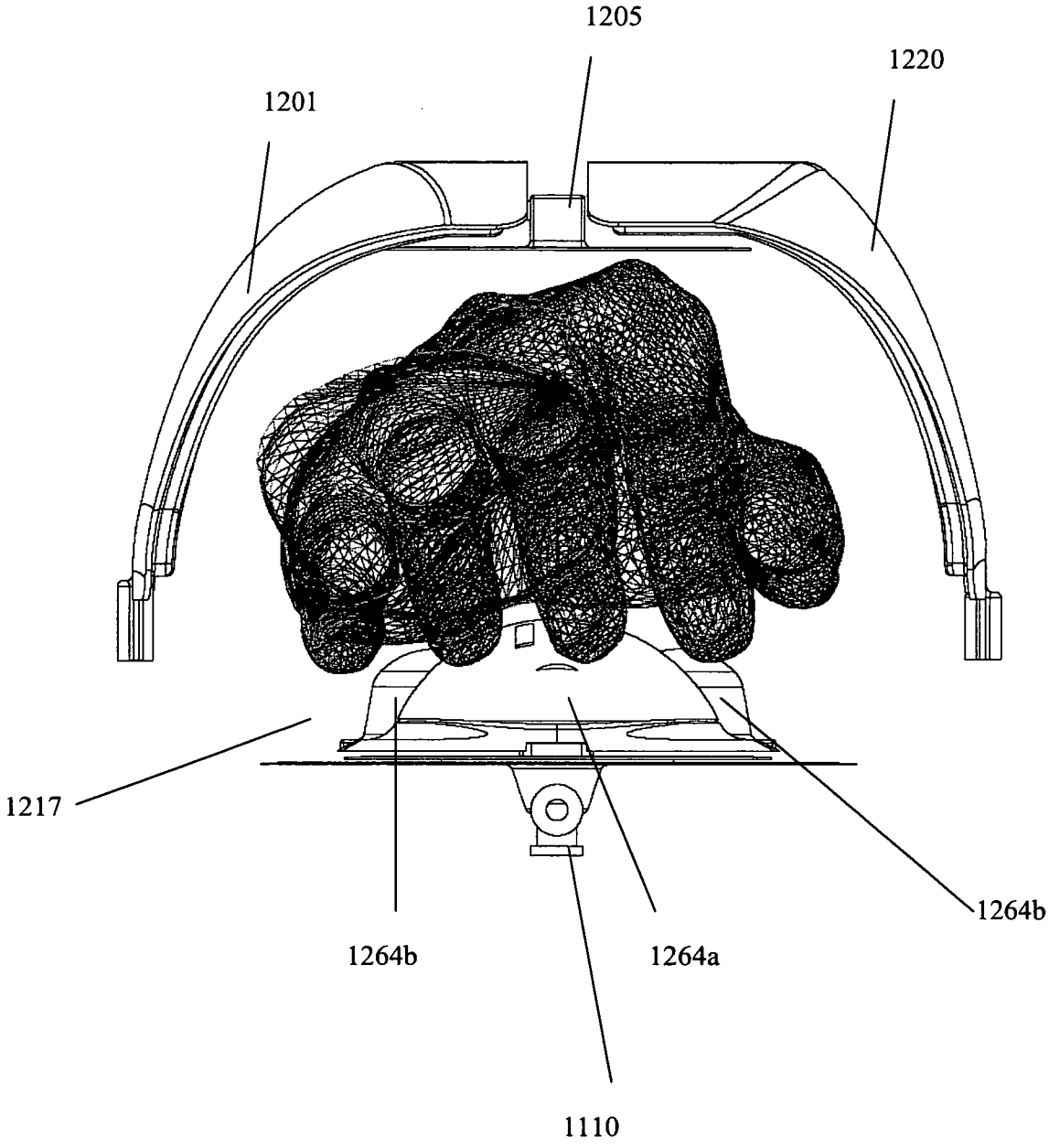

Figure 16

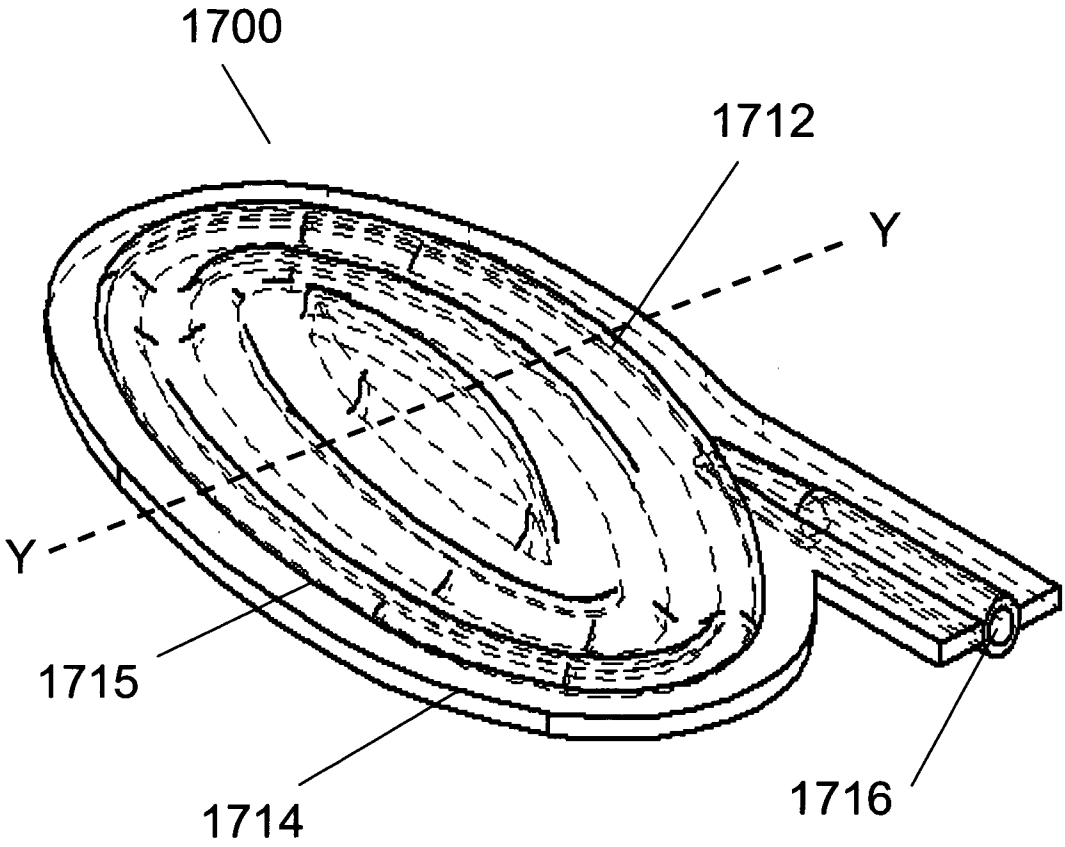

Figure 17A

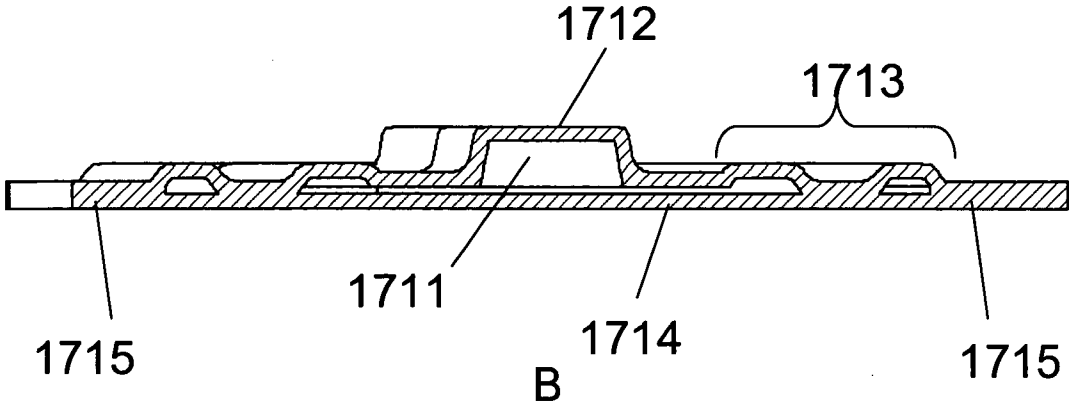

Figure 17B

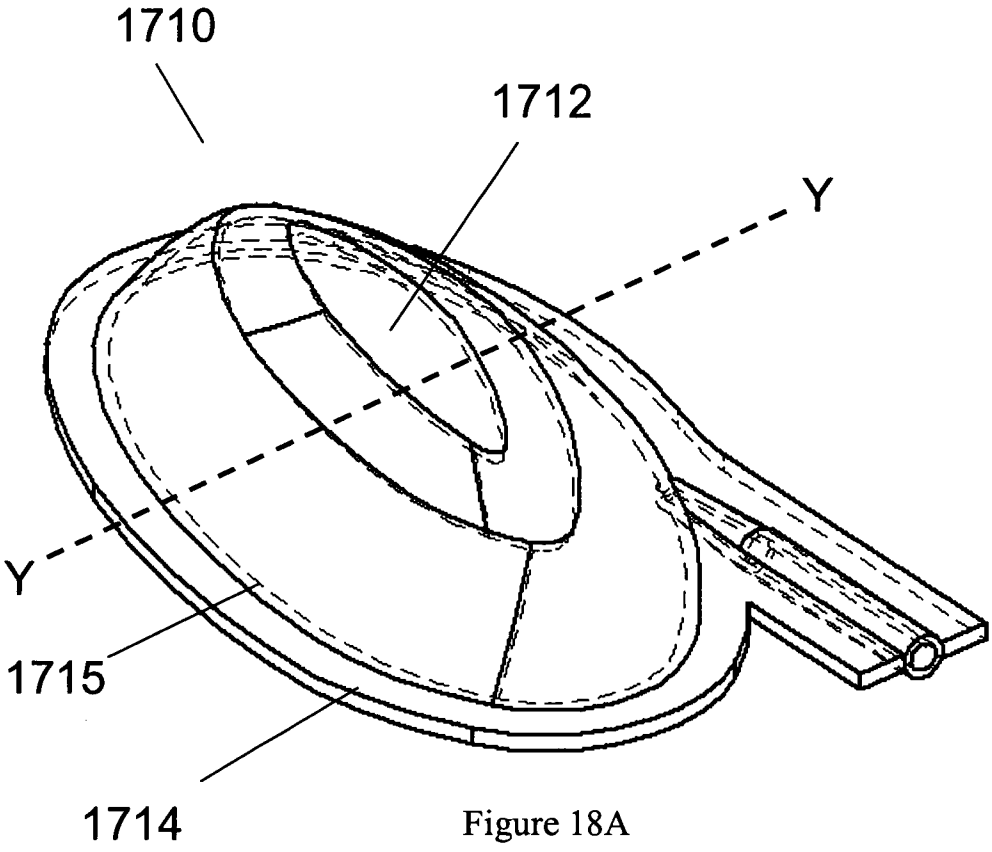

Figure 18A

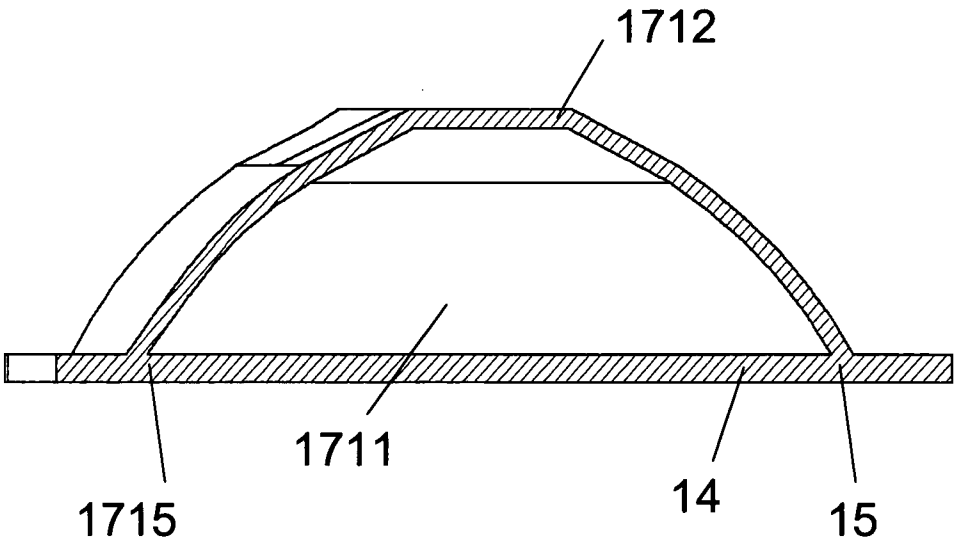

Figure 18B

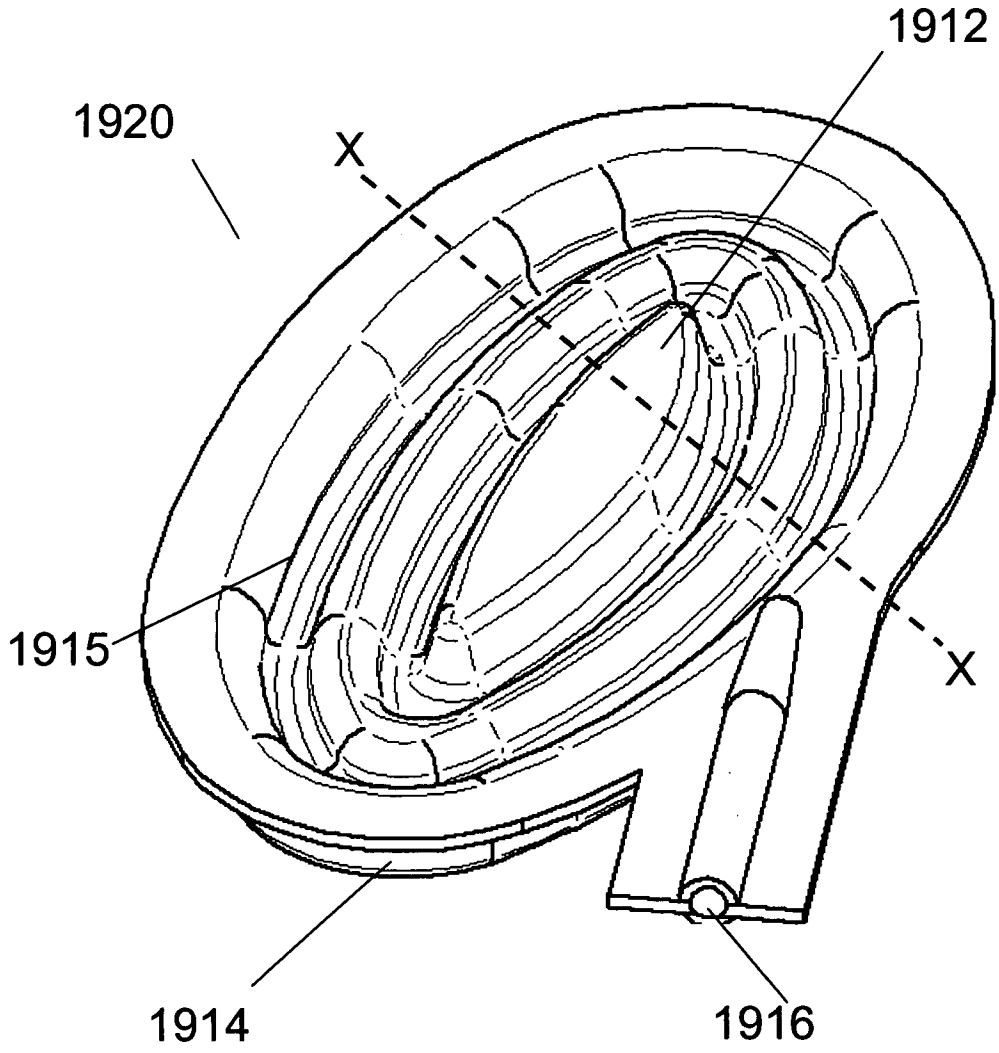

Figure 19A

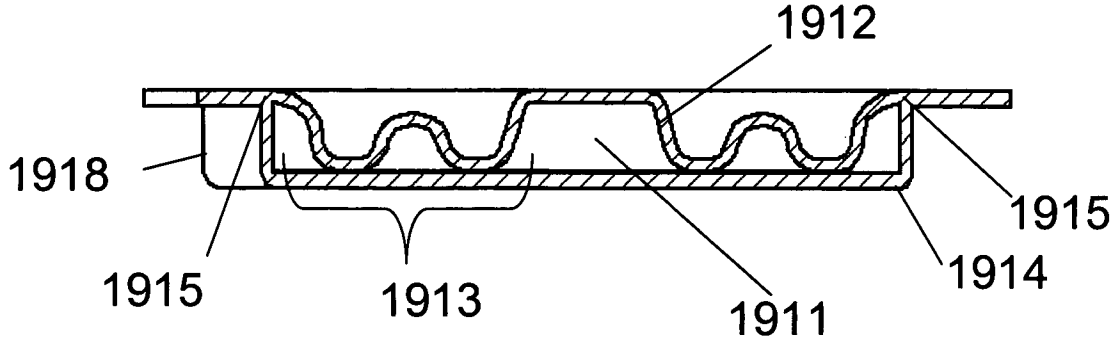

Figure 19B

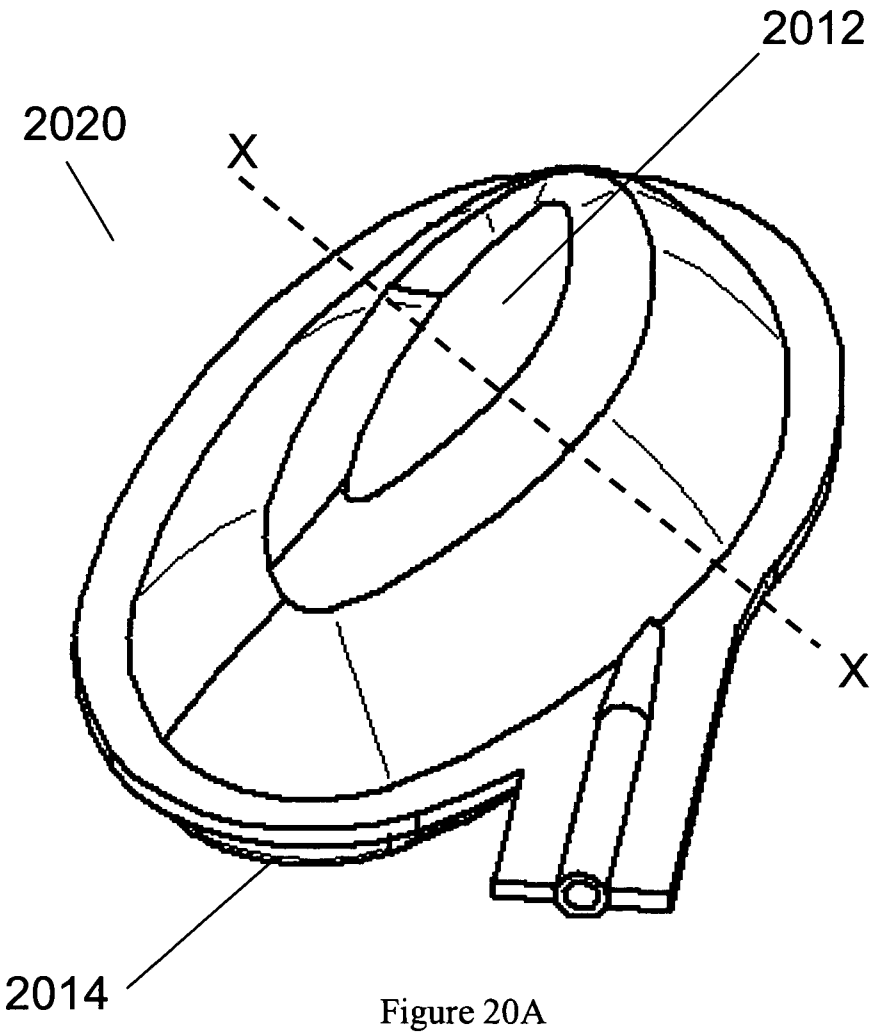

Figure 20A

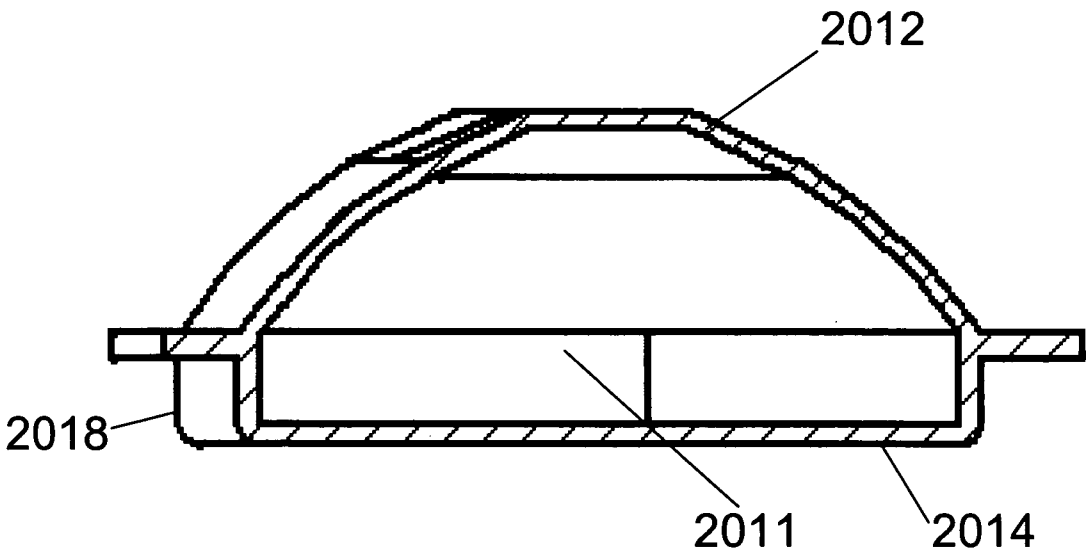

Figure 20B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2010/000103

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ***A61H 7/00*** (2006.01)

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)

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)
WPI and EPODOC and IPC mark A61H and keywords: massage and hand and housing and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7374549 B2 (INADA et al.) 20 May 2008 Column 6 line 25 to column 9 line 8	1-3,5-8,10,11,13,14, 16-21,26-28,31-34
Y		4,9,12,15,25
X	US 2009/0048547 A1 (CHEN) 19 February 2009 Paragraphs 12 to 29	1-3,5,7,8,13,14,16-23,26-28,31-34
Y		4,9,12,15,25,29,30
X	US 2003/0130691 A1 (PORRATA et al.) 10 July 2003 Paragraphs 26 to 31	1-3,5-8,18,20,31-34
Y		4,9,12,15,25,29,30

[X] Further documents are listed in the continuation of Box C [X] 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
05 May 2010	10 MAY 2010

Name and mailing address of the ISA/AU

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Authorized officer
DAVID MELHUISH
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No : +61 2 6283 2426

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2010/000103

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0240230 A1 (PRESTON et al.) 27 October 2005 Paragraphs 19 to 22	1-3,5,7,8,16,18-20,28,31-34
Y		4,9,12,15,25,29,30
X	US 6039703 A (BADILLA) 21 March 2000 Column 2 line 24 to column 3 line 20	1-3,7,8,16-20,31-34
Y		4,9,12,15,25,29,30
Y	WO 2008/051165 A1 (OSIM INTERNATIONAL LTD) 2 May 2008 Figure 1	4,9,12,15
Y	WO 2003/007804 A2 (M.D. BROTHERS, INC.) 30 January 2003 Page 15 line 18 to page 16 line 3, figure 3	25
Y	US 2006/0229678 A1 (LEE) 12 October 2006 Figure 1	29,30

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/SG2010/000103

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	7374549	CN	1697642	EP	1645261	JP	2005028045
		KR	20060021277	US	2006069325	WO	2005004782
US	2009048547	NONE					
US	2003130691	EP	1465561	US	7476207	WO	03017888
US	2005240230	US	7110810				
US	6039703	NONE					
WO	2008051165	CN	101600409	EP	2076231	US	2010094184
WO	03007804	AU	2002324516	CA	2454064	EP	1448122
		US	2003018286	US	6979305		
US	2006229678	DE	102006002364	FR	2884328	GB	2425065
		JP	2006289047	KR	20060108232		

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX