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- (71) **Applicant (for all designated States except US):** **180S, INC.** [US/US]; 701 E. Pratt St., Suite 180, Baltimore, MD 21202-3101 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **DROSIHN, Lonnie** [US/US]; 3900 Stansbury Mill Rd., Monkton, MD 21111 (US). **PHELPS, Deborah, Lynn** [US/US]; 4420 Clydesdale Ave., Baltimore, MD 21211 (US). **YANG, Zhiping** [US/US]; 9515 Kings Grant Rd., Laurel, MD 20723 (US).
- (74) **Agents:** **LYNCH, Thomas, W.** et al.; Edell, Shapiro & Finnan, LLC, 1901 Research Blvd Suite 400, Rockville, MD 20850-3164 (US).

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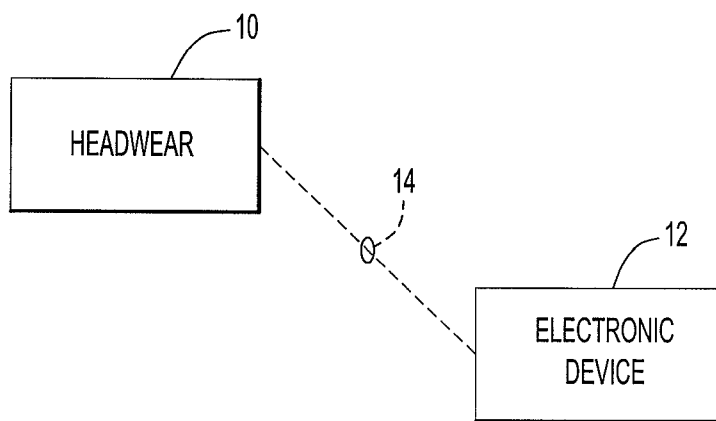


FIG.1

(57) **Abstract:** An accessory, such as an ear covering device, that can be used to communicate wirelessly with different types of electronic devices is disclosed. The accessory may include an electronic system or components that facilitates communication between the accessory and an electronic device.

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ACCESSORY WITH WIRELESS COMMUNICATION CAPABILITY

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an accessory that is configured for wireless communication with an electronic device. In particular, the present invention relates to an accessory that can be worn on the head of an individual to cover the user's ears and that can be used to communicate wirelessly with an electronic device. Such an accessory can be referred to as an ear covering device or an ear warmer.

[0002] Many people that spend time outside in the cool or cold weather desire protection for their ears from cold temperatures and inclement weather, including wind, rain, and snow. One device that can be used to protect a person's ears is an ear covering device or ear warmer. An ear covering device or ear warmer can be configured to be worn on a wearer's head and to cover the wearer's ears. Some ear covering devices include speakers that are connected by wires to an electronic device that generates outputs that the wearer can listen to or see while wearing the ear covering device. However, such ear covering devices may result in wires between the ear covering device and the electronic device becoming tangled. In addition, the available distance between the electronic device and the ear covering device may likely be limited. Further, the particular electronic devices that can be used with an ear covering device with a wired connection therebetween are limited in type.

[0003] There is a need for an accessory that has the capability of allowing the wearer of the accessory to communicate wirelessly with an electronic device. There is also a need for an accessory that can be used wirelessly with several different types of electronic devices.

SUMMARY OF THE INVENTION

[0004] The present invention provides an accessory, such as an ear covering device, that can be used to communicate wirelessly with different types of electronic devices. In one embodiment, the accessory includes an electronic system or components that facilitates wireless communication between the accessory and an electronic device. In various implementations, the electronic device can vary. For example, the electronic device can be a cell phone, a personal data assistant (PDA), an iPod® mobile digital device, an iPod touch® mobile digital device, an audio output generating device, or a video output generating device. In other words, any electronic device to and from which signals can be sent by a user wirelessly can be used with the accessory.

[0005] In one embodiment, an ear covering device includes a fabric shell and a frame. The fabric shell can be formed by one or more fabric members that are coupled together to form an interior region into which a portion or all of the frame can be inserted. In different embodiments, the frame can have an adjustable length or a fixed length. In an alternative embodiment, the ear covering device includes a frame and several shell portions that each cover a portion of the frame and that are removably coupleable to the frame.

[0006] In one embodiment, the electronic components of the ear covering device are configured to communicate wirelessly with an electronic device. In one implementation, the wireless communications utilize BLUETOOTH wireless technology. In another implementation, the wireless communications utilize infrared (IR) technology.

[0007] In one embodiment, the ear covering device includes a frame, a fabric shell configured to cover a portion of the frame, and an electronic system configured to communicate wirelessly

with an electronic device. The electronic system can be coupled to the fabric shell. The electronic system includes an input device and an output device. In addition, the frame is configured to extend around the back of a head of a wearer of the ear covering device. In one embodiment, the fabric shell includes a coupler and the electronic system includes an electronic component that is coupled to the coupler of the fabric shell.

[0008] In one embodiment, the fabric shell includes a first ear portion, a second ear portion, and a middle portion located between the first ear portion and the second ear portion, and the electronic system includes a first speaker housing and a second speaker housing, the first speaker housing being proximate to the first ear portion of the fabric shell, and the second speaker housing being proximate to the second ear portion of the fabric shell. In addition, the first speaker housing is connected to the second speaker housing by a wire. Alternatively, the electronic system includes a first electronic component and a second electronic component, the first electronic component including the first speaker housing and the second electronic component including the second speaker housing, the first electronic component being accessible externally of the fabric shell, and the second electronic component being disposed internally of the fabric shell.

[0009] The fabric shell may include an outer fabric member and a shell liner, each of the first speaker housing and the second speaker housing being coupled to the shell liner. The shell liner includes a first opening and a second opening, the first speaker housing is engaged with the first opening of the shell liner and the second speaker housing is engaged with the second opening of the shell liner. The first electronic component is coupled to the shell liner by stitching and the second electronic component is coupled to the shell liner by stitching.

[0010] In an alternative embodiment, the ear covering device to be worn by a user around a back of a head of the user and the ear covering device includes a frame including a first ear portion, a second ear portion, and a band portion coupled to the first ear portion and to the second ear portion, a fabric shell forming an interior region, at least a portion of the frame being disposed in the interior region of the fabric shell, and an electronic system being configured to communicate wirelessly with an electronic device, the electronic system being coupled to one of the frame or the fabric shell.

[0011] In one embodiment, the electronic system includes a first electronic component including a first transducer and a second electronic component including a second transducer, the first electronic component and the second electronic component being connected to each other. In one embodiment, the first transducer is located proximate to the first ear portion of the frame and the second transducer is located proximate to the second ear portion of the frame. In one embodiment, the first electronic component includes a control portion for controlling the operation of the electronic system, the control portion being accessible outside of the fabric shell. In one embodiment, the first electronic component is accessible outside of the fabric shell and the second electronic component is disposed entirely within the interior region of the fabric shell.

[0012] In an alternative embodiment, the fabric shell includes a first ear portion, a second ear portion, and a middle portion located between the first ear portion of the fabric shell and the second ear portion of the fabric shell, the fabric shell including a mounting component coupled to the first ear portion of the fabric shell, the mounting component receiving the first electronic component and coupling the first electronic component to the fabric shell. The mounting component can be an eyelet with an opening and a projection extending into the opening, the first electronic component includes a groove, and the projection of the eyelet engages the groove

of the first electronic component when the first electronic component is coupled to the mounting component. The fabric shell includes an outer fabric member defining an opening and the eyelet is disposed proximate to the opening in the outer fabric member.

[0013] In an alternative embodiment, an ear covering configured to be worn by a user around a back of a head of the user includes a frame including a first ear portion, a second ear portion, and a band portion coupled to the first ear portion and to the second ear portion, a fabric shell including a first ear portion, a second ear portion, and a middle portion coupled to the first ear portion of the fabric shell and to the second ear portion of the fabric shell, the fabric shell forming an interior region, the frame being disposed in the interior region of the fabric shell, the fabric shell including a shell liner disposed within the interior region, and an electronic system being configured to communicate wirelessly with an electronic device, the electronic system including a first electronic component disposed proximate to the first ear portion of the frame and the first ear portion of the fabric shell, the first electronic component including a transducer for generating audible outputs, the first electronic component including a control portion for controlling the operation of the electronic system, the first electronic component being coupled to the shell liner, and a second electronic component disposed proximate to the second ear portion of the frame and the second ear portion of the fabric shell, the second electronic component connected to the first electronic component via a wire, the second electronic component being coupled to the shell liner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Fig. 1 illustrates a schematic block diagram of an embodiment of a headwear article.

- [0015] Fig. 2 illustrates a schematic block diagram of an alternative embodiment of a headwear article.
- [0016] Fig. 3 illustrates a schematic block diagram of an alternative embodiment of a headwear article.
- [0017] Fig. 4A illustrates a perspective view of an embodiment of an ear covering device.
- [0018] Fig. 4B illustrates a perspective view of an alternative embodiment of an ear covering device.
- [0019] Fig. 4C illustrates a perspective view of an exemplary electronic component that can be used with an ear covering device.
- [0020] Fig. 5 illustrates a perspective view of an embodiment of an ear covering device in combination with an electronic device.
- [0021] Fig. 6 illustrates a perspective view of an alternative embodiment of an ear covering device in combination with an electronic device.
- [0022] Fig. 7 illustrates an embodiment of an electronic device and an adapter that can be used with an ear covering device.
- [0023] Fig. 8 illustrates an exploded view of some of the components of an ear covering device.
- [0024] Fig. 9 illustrates a top view of the ear covering device illustrated in Fig. 5.
- [0025] Fig. 10 illustrates a cross-sectional front view of a portion of the ear covering device illustrated in Fig. 5 taken along the line "10-10."

[0026] Fig. 11 illustrates a cross-sectional front view of a portion of the ear covering device illustrated in Fig. 6 taken along the line "11-11."

[0027] Fig. 12 illustrates an exploded view of some of the components of an alternative embodiment of an ear covering device.

[0028] Fig. 13 illustrates an exploded view of some of the components of an alternative embodiment of an ear covering device.

[0029] Fig. 14 illustrates an exploded perspective view of an alternative embodiment of an article of headwear.

[0030] Fig. 15 illustrates a bottom perspective view of the article of headwear illustrated in Fig. 14.

[0031] Fig. 16 illustrates a cross-sectional front view of a portion of the article of headwear illustrated in Fig. 14 taken along line "16-16."

[0032] Fig. 17 illustrates a perspective view of some components of an alternative embodiment of an ear covering device.

[0033] Fig. 18 illustrates another perspective view of the components illustrated in Fig. 17.

[0034] Fig. 19 illustrates a planar view of the ear portion illustrated in Fig. 17.

[0035] Fig. 20 illustrates a side view of the electronic device illustrated in Fig. 17.

[0036] Fig. 21 illustrates an outer side view of the electronic device illustrated in Fig. 20.

[0037] Fig. 22 illustrates an inner side view of the electronic device illustrated in Fig. 20.

[0038] Fig. 23 illustrates a perspective view of an alternative embodiment of an ear covering device.

[0039] Fig. 24 illustrates another perspective view of the ear covering device illustrated in Fig. 23.

[0040] Fig. 25 illustrates an outer side view of the shell of the ear covering device illustrated in Fig. 23.

[0041] Fig. 26 illustrates an inner side view of the shell of the ear covering device illustrated in Fig. 23.

[0042] Fig. 27 illustrates an inner side view of an alternative embodiment of a shell of an ear covering device.

[0043] Fig. 28 illustrates an outer side view of an outer fabric member of the shell illustrated in Fig. 26.

[0044] Fig. 29 illustrates an outer side view of a shell liner of the shell illustrated in Fig. 26.

[0045] Fig. 30 illustrates an inner side view of several components of the shell illustrated in Fig. 26.

[0046] Fig. 31 illustrates an exploded view of several components of the shell illustrated in Fig. 26.

[0047] Fig. 32 illustrates an exploded view of several components of the ear covering device illustrated in Fig. 23.

[0048] Fig. 33 illustrates a perspective view of a component of a shell of an ear covering device.

[0049] Fig. 34 illustrates a perspective view of an embodiment of a control portion of the ear covering device illustrated in Fig. 23.

- [0050] Fig. 35 illustrates an outer side view of the control portion illustrated in Fig. 34.
- [0051] Fig. 36 illustrates a side view of the control portion illustrated in Fig. 34.
- [0052] Fig. 37 illustrates an outer side view of an embodiment of a component of the control portion illustrated in Fig. 34.
- [0053] Fig. 38 illustrates a cross-sectional side view of the component illustrated in Fig. 37 taken along the line "38-38."
- [0054] Fig. 39 illustrates a lower perspective view of an embodiment of a speaker housing of the control portion illustrated in Fig. 34.
- [0055] Fig. 40 illustrates a side view of the control portion illustrated in Fig. 34 with the speaker housing.
- [0056] Fig. 41 illustrates a lower perspective view of the control portion illustrated in Fig. 40.
- [0057] Fig. 42 illustrates a perspective view of an electronic component located in another ear portion of the ear covering device illustrated in Fig. 23.
- [0058] Fig. 43 illustrates a lower perspective view of the electronic component illustrated in Fig. 42.
- [0059] Fig. 44 illustrates an exploded side view of the electronic component illustrated in Fig. 42.
- [0060] Fig. 45 illustrates an exploded assembly view of some components of an alternative embodiment of an ear covering device.
- [0061] Fig. 46 illustrates an exploded assembly view of some components of an alternative embodiment of an ear covering device.

[0062] Fig. 47 illustrates a perspective view of the coupler illustrated in Fig. 46.

[0063] Fig. 48 illustrates an exploded view of some components of an alternative embodiment of an ear covering device.

[0064] Fig. 49 illustrates an assembled view of the components illustrated in Fig. 48.

[0065] Like reference numerals are used to identify like elements throughout this disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0066] The terms “ear covering device,” “ear protection device,” and “ear warmer” may be used interchangeably herein to refer to a device or structure that is configured to be worn by an individual to cover the user’s ears. Such a device can keep the user’s ears warm and can be referred to as an accessory. The term “headwear” is used herein to refer to an accessory that can be worn on a user’s head. The term “headwear” may include ear covering devices, helmets, hats, and other articles. The term “electronic device” is used herein to refer to a device that has electronic components and that can be used to communicate with another person and that can be used to generate audio and/or visual outputs. The terms “wearer” and “user” may be used interchangeably herein to refer to the person wearing or using an accessory according to the present invention.

[0067] A schematic block diagram of an accessory according to the present invention is illustrated in Fig. 1. In this embodiment, the accessory or headwear 10 can be used with an electronic device 12. In one implementation, the headwear 10 can be an ear covering device that can be worn by a user and that is configured to cover the ears of the user. Some examples of ear covering devices are described in greater detail below. The headwear 10 is in communication with the electronic device 12 via communication link 14. The communication link 14 is a

wireless communication link between the headwear 10 and the electronic device 12. The wireless communication link 14 can be achieved using BLUETOOTH wireless technology. Alternatively, the wireless communication link 14 can be achieved using IR technology.

[0068] Referring to Fig. 2, an alternative embodiment of an accessory according to the present invention is illustrated. Accessory or headwear 20 includes an electronic system with several electronic or electrical components. In this implementation, headwear 20 includes a controller 22 that is coupled to a power source 24, such as a battery. The electronic components also include an output device 26 and an input device 28. The output device 26 can be an audible output device, such as a speaker or transducer, that can be used to generate audible output including speech, sounds, music, etc. Alternatively, the output device 26 can be a visual output device, such as a display or screen, that can be used to generate visual output, including video or images. The input device 28 can be a device that can be used by the wearer to provide input. For example, the input device 28 can be a microphone into which the wearer can speak. The electronic components also include controls 30 that can be manipulated by a user to provide particular inputs to the electronic system. Some exemplary controls 30 may include an on/off switch, an output selection switch, and volume adjustment switches.

[0069] As shown in Fig. 2, the headwear 20 can be used with an electronic device 40. The electronic device 40 can be any type of electronic device, including but not limited to a cell phone, a PDA, an iPod® mobile digital device, an iPod touch® mobile digital device, an audio output generating device, a video output generating device, or an audio and video output generating device. The electronic device 40 can be used to listen to various audible content, including but not limited to the radio, stored audio file, and streaming audio files.

[0070] As shown, the headwear 20 can include a transmitter 32 and the electronic device 40 can include a transmitter 44. The transmitters 32 and 44 can function as transmitters and receivers to facilitate communication between the headwear 20 and the electronic device 40. As a result, a communication link 42 can be established between the headwear 20 and the electronic device 40 and in this embodiment, the communication link 42 can be a wireless link. The wireless link 42 allows the headwear 20 and the electronic device 40 to be spaced apart from each other, thereby facilitating the ease of use of the electronic device 40 while the user wears the headwear 20.

[0071] The controls 30 on the headwear 20 allow the user to control activity on the electronic device 40 through the wireless communication link 42. For example, controls 30 may include a selection switch 34 that can be manipulated by a user to select a particular output from the electronic device 40.

[0072] In one implementation, the electronic device 40 can be an audible output generating device, such as an iPod® mobile digital device or iPod touch® mobile digital device, on which many electronic files representing songs can be stored. The selection switch 34 on the headwear 20 can be used to scroll forward or backward through a particular list of songs on the electronic device 40. In addition, the selection switch 34 can be used to navigate through menus of artists, songs, etc. as well as other options on the electronic device 40. The output, whether audible and/or visual, that is generated by the electronic device 40 can be heard or seen by the wearer of the headwear 20 via output device 26.

[0073] In another implementation, the electronic device 40 can be a phone, such as a cell or cellular phone. The controls of the headwear 20 can be used to answer the phone when an incoming call is being received or to hang up or terminate a call in progress. In addition, the

other party or parties to the call can be heard by the wearer of the headwear 20 through output device 26. The wearer of the headwear 20 can speak on the call by using the input device 28. Thus, the electronic device 40 can be used in a wireless and “hands-free” manner.

[0074] In one implementation, transmitters 32 and 44 are each BLUETOOTH enabled transmitters. Each transmitter unit can be programmed with an address that is within a range of addresses that has been established for a particular type of device. When the electronic device 40 is turned on, the transmitter 44 sends radio signals seeking a response from any devices with an address in a particular range. If the headwear 20 is turned on and its address is within the range, the headwear 20 responds via transmitter 32 and a network is formed between the headwear 20 and the electronic device 40. The formation of the network between the headwear 20 and the electronic device 40 results in the headwear 20 and the electronic device 40 ignoring signals from another system or device. Once a network is formed between them, the devices 20 and 40 begin communicating between themselves. Such communications will result in input or control signals being sent from the headwear 20 to the electronic device 40 and output signals being sent from the electronic device 40 to the headwear 20.

[0075] In another implementation, the communications between the headwear 20 and the electronic device 40 can be accomplished using an infrared (IR) technology. In this implementation, the communications are accomplished using IR transmitters and receivers. Each of the headwear 20 and the electronic device 40 includes an IR transmitter and an IR receiver that can be used to communicate to the corresponding components on the other article.

[0076] Referring to Fig. 3, another embodiment of an accessory according to the present invention is illustrated. The accessory or ear covering device 50 includes several electronic components. In this embodiment, the electronic components may include a circuit board 52, a

power source 54 such as a battery, controls or switches 56, a speaker 58, and a microphone 60. In other embodiments, the particular components of the ear covering device 50 can vary. The circuit board 52, as well as the other circuit boards described herein, can be a BLUETOOTH printed circuit board with stereo capability.

[0077] An electronic device 70 can be used to communicate with the ear covering device 50. The electronic device 70 can include a power source 72 and a memory 78 in which various output files, such as a music or sounds, can be stored. The electronic device 70 can also include controls 74, such as an on/off switch, a volume control switch, and an output selection switch, that can be manipulated by a user to control the electronic device 70 and adjust the corresponding output levels. In addition, the electronic device 70 can include a broadcaster or transmitter 76 that can be used to communicate with the ear covering device 50 via wireless communication link 80. In one implementation, the transmitter 76 may be configured to communicate using BLUETOOTH technology. In another implementation, the transmitter 76 may be configured to communicate using IR technology.

[0078] An embodiment of an accessory or an ear covering device according to the present invention is illustrated in Fig. 4A. In this embodiment, the ear covering device 100 is adapted to be worn over the ears of an individual. When it is worn, the ear covering device 100 extends around the back of the head and/or neck of the wearer. The ear covering device 100 includes a fabric shell or shell portion 102 that defines an interior region and a frame (not shown in Fig. 4A) that is disposed within the interior region of the shell 102. The frame can be fixed in length or can be adjustable in length.

[0079] The ear covering device 100 includes ear portions 110 and 112 and a middle portion 114 that is disposed between the ear portions 110 and 112. In this embodiment, the middle

portion 114 is narrower than the ear portions 110 and 112. In alternative embodiments, the relative dimensions of the middle portion 114 and the ear portions 110 and 112 can vary relative to each other.

[0080] The ear covering device 100 includes an inner surface 120 that is disposed proximate to a user's ears and head when the device 100 is worn by a user. The ear covering device 100 includes an outer surface 122 that is opposite the inner surface 120 and oriented away from the user's ears and head when the device 100 is worn by a user. The ear covering device 100 has a lower edge 124 when the device 100 is disposed in its intended use orientation.

[0081] The ear covering device 100 is configured to communicate wirelessly with an electronic device (not shown). The ear covering device 100 includes several electronic components, only some of which are shown in Fig. 4A. The ear covering device 100 includes a control portion 130 that includes an on/off switch 136 and volume control switches 132 and 134. Volume control switches 132 and 134 can be used to increase and to decrease, respectively, the volume of an audible output generated by a speaker or transducer disposed with the shell 102. The ear covering device 100 can also include an input device 138, such as a microphone, that can be used by a wearer of the ear covering device 100. When the ear covering device 100 is used in communication with an electronic device such as a cell phone, the wearer of the ear covering device 100 can speak into the microphone 138 to communicate via the cell phone. In different embodiments of ear covering devices according to the present invention, the location, quantity, and types of controls 130 and input devices 138 can vary.

[0082] Referring to Figs. 4B and 4C, another exemplary embodiment of an ear covering device according to the present invention is illustrated. In this embodiment, the ear covering device 150 includes a fabric shell or shell portion 152 defining an interior region into which a frame (not

shown) can be inserted. The ear covering device 150 includes ear portions 160 and 162 and a middle portion 164 disposed between the ear portions 160 and 162. The ear covering device 150 also includes an inner surface 170, an opposite outer surface 172, and a lower edge 174.

[0083] Similar to ear covering device 100, ear covering device 150 is configured to communicate wirelessly with an electronic device (not shown). The ear covering device 150 includes a control portion 180 that includes a housing 182 with a button 184 that can be centrally located on the housing 182. The housing 182 includes an edge 183 that defines an opening in which the button 184 is disposed. The button 184 can be mounted above several switches or contacts such that movement of the button 184 in a particular direction closes the switch or contact in that corresponding location. For example, the button 184 may have locations 185, 186, 187, and 188 that correspond to different functions, such as volume control, selection of a particular output, advancing forward or backward through available outputs, etc. When the user wants to provide a particular input to the electronic system of the ear covering device 150, the user can press on the corresponding portion of the button 184. In different embodiments, the shape and configuration as well as the location of the housing 182 can vary. In addition, the function and operation of the control portion 180 can vary.

[0084] The ear covering device 150 can also include an input device 190, such as a microphone, that can be used by a wearer of the ear covering device 150. In this embodiment, the input device 190 can be disposed within the housing 182 and can receive sounds through an opening in the housing 182. In another embodiment, an input device 192 can be disposed within the shell 152 proximate to the lower end 172 instead of within the housing 182.

[0085] Referring to Fig. 5, an exemplary embodiment of an ear covering device according to the present invention is illustrated. In this embodiment, the ear covering device 200 includes ear

portions 210 and 212 and a middle portion 214 disposed between the ear portions 210 and 212. A fabric shell 202 covers the frame of the ear covering device 200. An exemplary electronic device 250 is illustrated in communication with the ear covering device 200. The ear covering device 200 and the electronic device 250 are configured to communicate with each other wirelessly as illustrated by communications link 260. A cross-sectional view taken along line "10-10" in Fig. 5 is illustrated in Fig. 10 and described in greater detail below. Exemplary ear covering devices, including frames, shells, membranes, and other components of such devices are also set forth in U.S. Patent Nos. 5,835,609; 6,499,146; 6,502,248; and 6,735,784, and the disclosures of each of those patents is incorporated by reference herein in its entirety.

[0086] Referring to Fig. 6, an alternative embodiment of an ear covering device according to the present invention is illustrated. In this embodiment, the ear covering device 300 includes a band 310 that has ear portions 312 and 314 and a middle portion 316. The middle portion 316 is an elongate member and has two opposite ends. In one embodiment, the ear portions 312 and 314 are movably coupled to opposite ends of the middle portion 316. In another embodiment, the ear portions 312 and 314 are fixedly coupled to opposite ends of the middle portion 316. In yet another embodiment, the ear portions 312 and 314 can be integrally formed with the middle portion 316.

[0087] The ear portions 312 and 314 are illustrated in Fig. 6 as being disposed in their deployed positions in which the ear covering device 300 can be worn on a user's head. The movably coupled ear portions 312 and 314 can be pivoted relative to the middle portion 316 to collapsed positions that facilitate the transportation and carrying of the ear covering device 300. Ear portion 314 includes an edge 318 that defines an opening 320. While not shown in Fig. 6, ear portion 312 includes an edge and an opening similar to ear portion 314.

[0088] The ear covering device 300 includes a fabric member 330 that is coupled to ear portion 314. In one implementation, the fabric member 330 can be fixedly coupled to the ear portion 314, such as by sewing, welding, an adhesive, etc. In another implementation, the fabric member 330 can be removably coupled to the ear portion 314, such as by providing a coupling structure that can be placed around a portion of the perimeter of the ear portion 314. Similarly, a fabric member 340 can be fixedly coupled or removably coupled to ear portion 312 of the band 310. Exemplary ear covering devices that can be used according to this invention are disclosed in U.S. Patent Application No. 10/638,476, published as U.S. Patent Application Publication No. 2005/0034216A1, the disclosure of which is incorporated by reference herein in its entirety.

[0089] As shown in Fig. 6, ear covering device 300 can be used with an electronic device 350. Ear covering device 300 can communicate wirelessly with the electronic device 350 via a communication link 360 in a manner similar to that described above.

[0090] Referring to Fig. 7, embodiments of an electronic device and a communicator according to the present invention are illustrated. As shown, the electronic device 400 includes a body 410 and a control portion 412 with one or more controls that can be manipulated by a user to control one or more functions of the electronic device 400. The body 410 and the control portion 412 of the electronic device 400 can have any shape or configuration in various embodiments. The body 410 includes a port 414 which in one embodiment can be a USB port.

[0091] As shown in Fig. 7, a communicator 420 can be used with the electronic device 400 so that it can communicate wirelessly with other devices. The communicator 420 can include a broadcaster or transmitter 422 that is coupled to a jack 424 via a wire 428. The jack 424 can have a connection or connection portion 426 that can be inserted into the port 414 of the body 410. In this embodiment, the broadcaster or transmitter 422 is configured to communicate with

other electronic device using BLUETOOTH wireless technology. In an alternative embodiment, the broadcaster or transmitter is configured to communicate using IR technology.

[0092] Referring to Fig. 8, an exemplary embodiment of an ear covering device according to the present invention is illustrated. In this embodiment, the ear covering device 500 includes a shell 510 that has ear portions 512 and 514 and a middle portion 516 disposed between the ear portions 512 and 514. The various components of the electronic system are disposed within the shell 510 of the ear covering device 500. For ease of reference, the components are illustrated outside of the shell 510 in Fig. 8.

[0093] In this embodiment, the ear covering device 500 includes a circuit board 520 that can be disposed proximate to one of the ear portions 512 and 514. Speakers 530 and 532 are disposed proximate to the ear portions 512 and 514 and can be powered by power sources 540 and 542, respectively. In one implementation, the power sources can be batteries. In another implementation, the power sources can be rechargeable batteries. In this embodiment, speaker 532 in ear portion 514 is configured to wirelessly receive signals from the circuit board 520, thereby eliminating the need for wires between the speakers 530 and 532. The ear covering device 500 also includes an input device 560, such as a microphone, that can be used by the wearer to provide an input, such as speech.

[0094] The ear covering device 500 can be worn during rain, snow and other inclement weather. Accordingly, in one embodiment, the ear covering device 500 includes a housing 550 in which various components of the electronic system, such as the circuit board 520 and speaker 530, can be disposed. The housing 550 can be used to protect critical electronic components. In one implementation, the housing 550 can be waterproof. In another implementation, the housing 550 can be made of a weather resistant material. Similarly, the speaker 532 associated with ear

portion 514 can be disposed within another housing 552, which can be the same as housing 550. The housings 550 and 552 can have different shapes and configurations in various embodiments.

[0095] Referring to Fig. 8, the electronic components can also include controls or a control portion 570 that includes volume switches 572 and 574 and an on/off switch 576. In another implementation, the control portion 570 can include a selection switch 578 that can be manipulated by a user to select different outputs from the electronic device. The selection switch 578 is connected to the circuit board 520 and a transmitter, which can be included in the circuit board 520. The transmitter is configured to send signals to an electronic device (not shown) to advance or to move back to a particular item in memory of the electronic device, such as a song or other audible or visual output. The configuration of the control portion 570 can vary in different embodiments.

[0096] Referring to Figs. 9 and 10, ear covering device 200 is illustrated in greater detail. Ear covering device 200 includes an inner surface 220, an outer surface 222, and a binding 224 that extends along the perimeter of the shell 202. As shown in Fig. 10, in one implementation, the shell 202 can be formed by an inner membrane 230 and an outer membrane 232 that are coupled together. The inner membrane 230 and the outer membrane 232 define an interior region 234 in which a frame 235 is disposed.

[0097] Some of the electronic components of ear covering device 200 are illustrated in Fig. 10. In this embodiment, the ear covering device 200 includes a housing 270 similar to housing 550 in which a circuit board (not shown) is disposed. Connected to the circuit board by wire 274 is a speaker 272. A control portion 280 can be connected to the circuit board by a wire 282. The control portion 280 can have any combination of controls and switches as described herein. An

input device 290, such as a microphone, can be connected to the circuit board by a wire 292 as well.

[0098] When the ear covering device 200 is worn by a user, the inner membrane 230 is disposed proximate to the user's head or ears. In the orientation shown in Fig. 10, the input device 290 is proximate to the lower end or edge of the ear portion 212 so that the detection of a user's voice is facilitated. It is to be understood that the other ear portion 214 can have some of the same components in the interior region defined by the ear portion 214 and that those components communicate with the components in ear portion 212.

[0099] Referring to Fig. 11, a cross-sectional view of the ear covering device 300 illustrated in Fig. 6 is shown. Ear covering device 300 includes a frame 345, which in this case is an ear portion. As previously described, a fabric member 330 can be coupled to the ear portion of the frame 345. In this embodiment, the ear covering device 300 does not have a shell that defines an interior region in which the frame 345 is disposed. The fabric member 330 may include an inner side 332, an outer side 334 and a coupling member or portion 336 that is used to couple the fabric member 330 to the frame 345.

[0100] A layer of material 380 is coupled to the fabric member 330 to form a pouch or receptacle 382 into which some of the electronic components of the system are disposed. For example, as shown in Fig. 11, the ear covering device 300 can include a housing 370, similar to housing 550, that can contain a circuit board therein. In addition, a speaker 372 is connected to the board by a wire 374. In various embodiments of ear covering devices, a control portion or controls can be located along the ear portion of the frame 345 or the fabric member 330.

[0101] Referring to Fig. 12, an alternative embodiment of an ear covering device according to the present invention is illustrated. In this embodiment, the ear covering device 600 includes a

fabric shell 610 that has ear portions 612 and 614 and a middle portion 616 therebetween. In one implementation, the fabric shell 610 can be formed by an inner membrane and an outer membrane coupled together. Alternatively, the fabric shell 610 can be formed by multiple membranes coupled together. In yet another embodiment, the fabric shell 610 can be formed by a single membrane that is folded.

[0102] In this embodiment, the ear covering device 600 includes an electronic system that can be used to communicate with an electronic device. The electronic system includes a circuit board 620 and speakers 630 and 632. Speaker 630 is connected to the circuit board 620 via wire 635. Speaker 632 is connected to speaker 630 via wire 634. Signals received by speaker 630 can be transmitted to speaker 632. Wire 634 is passed through the middle portion 616 of the shell 610 between the ear portions 612 and 614. A power source 640, such as a battery, is used to supply power to the speaker 630 and the board 620. The board 620 can be disposed in a housing 650, similar to housing 550. Ear covering device 600 can include an input device 660, such as a microphone, and a control portion 670 with controls 672, 674, 676, and 678. Controls 672 and 674 can control volume, control 676 can perform an on and off function, and control 678 can be a selection control or switch that can be used to connect to the electronic device. The control portion 670 may include additional controls or switches that can be actuated to perform various tasks, such as answering a call on an electronic device that is a cell phone.

[0103] Referring to Fig. 13, an alternative embodiment of an ear covering device according to the present invention is illustrated. In this embodiment, the ear covering device 700 includes a fabric shell that is formed using several fabric membranes. An outer membrane portion 710 has ear portions 712 and 714 and a middle portion 716. In this implementation, the ear portions 712 and 714 and middle portion 716 are integrally formed. An inner membrane portion 720 includes

ear portions 722 and 724 and a middle portion 726. Ear portions 722 and 724 and middle portion 726 are separately formed and coupled to a corresponding portion of the outer membrane portion 710.

[0104] Ear covering device 700 includes a frame 730 that is disposed within the shell formed by outer membrane portion 710 and inner membrane portion 720. In this embodiment, the frame 730 includes ear portions 732 and 734 and band portions 736 and 738 that are slidably coupled together. The ear portions 732 and 734 are pivotally coupled to opposite ends of the band portions 736 and 738.

[0105] The electronic components of the ear covering device 700 include a circuit board 750, a power source 760, speakers 770 and 772 that are coupled by a wire 774, and a control portion 780 with controls or switches 782, 784, and 786. One or more components can be disposed within the housing 740, similar to housing 550. The housing 740 includes an interior region or receptacle 742 with a cover 744. In other embodiments, the housing 740 may have a different configuration by which components can be disposed in the receptacle 742, such as a slit or other opening.

[0106] Referring to Figs. 14-16, an alternative embodiment of an accessory or headwear article according to the present invention is illustrated. In this embodiment, the accessory 800 is a helmet that can be worn on an individual's head. The accessory 800 includes a shell 810 that has an outer surface 812, an inner surface 814 defining an interior region 816 (see Fig. 15), a lower end 818, and at least one coupler 820. The coupler 820 may be a hook-type or a loop-type material. The shell 810 can be used as a protective device, such as a work hat or a snow sports helmet.

[0107] As shown in Figs. 14, ear covering portions 830 and 840 can be coupled to the shell 810. The ear covering portions 830 and 840 can be disposed so that they extend downward from the shell 810 to cover the wearer's ears. Ear covering portion 830 includes an upper end 832 and a lower end 834. Proximate to the upper end 832 is a coupler 836. Coupler 836 can be one of a hook-type material and a loop-type material that can be coupled to cooperating material on the inner surface 814 of the shell 810.

[0108] Referring to Fig. 16, a cross-sectional front view of ear covering portion 840 is illustrated. Ear covering portion 840 includes a body 842 with an inner portion 844, an outer portion 846, and a lower portion 848 that collectively define a receptacle 850. The body 842 may include an opening 852 in communication with the receptacle 850. In one embodiment, an input device 854, such as a microphone, can be disposed in the opening 852.

[0109] Also disposed within the receptacle 850 is a layer of material 860 that is coupled to the ear covering portion by stitching 862. The layer of material 860 forms a pouch or receptacle 864 with the inner surface of inner portion 844. A speaker or transducer 872 can be disposed in the receptacle 864 so that it is positioned in an appropriate location proximate to the user's ear. The speaker 872 may be coupled via a wire 874 to a circuit board (not shown) located in a housing 870 that can be made of a waterproof or weather resistant material.

[0110] The headwear article 800 may be used with an electronic device (not shown) in a many similar to that described above with respect to the ear covering devices. The controls and circuit board may be located in either of the ear covering portions.

[0111] Referring to Figs. 17-22, an alternative embodiment of an ear covering device is illustrated. In this embodiment, the ear covering device 900 includes a frame and a fabric portion (not shown) that can be similar to previously described frames and fabric portions. In

one embodiment, the fabric portion forms a shell that covers all of the frame. In another embodiment, the fabric portion can cover a portion of the frame. The ear covering 900 includes a first ear portion, a second ear portion, and a middle portion located between the first ear portion and the second ear portion.

[0112] In this embodiment, the ear covering device 900 includes an electronic system having an electronic device 940 that includes a first portion or component that is located proximate to the first ear portion of the ear covering device 900. The electronic device 940 also includes a second portion or component (not shown) that is located proximate to the second ear portion of the ear covering device 900. In this embodiment, each of the first component and the second component includes an output device, such as a transducer or speaker. Accordingly, the first and second components provide a stereo sound output to the wearer of the ear covering device 900.

[0113] The first component and the second component are connected to each other. In one embodiment, the components are connected by a wire, cable, or other physical connection. In an alternative embodiment, the components are connected electronically so that a signal output by the first component wirelessly controls and communicates with the second component.

[0114] Referring to Fig. 17, one of the electronic components of the electronic device 940 is illustrated. In this embodiment, the electronic component includes a housing 950 and an output housing 980 that are coupled to each other by a link 990. The housing 950 contains several electronic components for the system, including a power source 951A, such as a battery or cell, a processor or controller 951B, and a receiver / transmitter unit 951C for communicating wirelessly with a remote electronic device. The housing 950 can be a molded plastic housing that is sealed so that it is waterproof. The output housing 980 includes an internal transducer 981 that is activated to generate audible outputs that can be heard by the wearer. The output housing

980 can be a molded plastic housing similar to housing 950. As discussed below, the output housing 980 includes several openings or holes that facilitate hearing the generated output.

[0115] In one embodiment, the link 990 is integrally formed with a portion of the housing 950 and a portion of the output housing 980. The link 990 is a flexible, elongate member that can bend and flex. In an alternative embodiment, the link 990 is formed integrally with one of the housing 950 and the output housing 980. In yet another embodiment, the link 990 is formed separately from the housing 950 and the output housing 980 and subsequently bonded to each of the housings 950 and 980. The link 990 has one end 992 coupled to housing 950 and an opposite end 994 coupled to output housing 980.

[0116] In this embodiment, the electronic device 940 is coupled to the ear portion 910 of the ear covering 900. While only the ear portion 910 is illustrated, it is to be understood that the frame of the ear covering 900 includes a band portion and another ear portion. Referring to Fig. 19, the ear portion 910 includes a mounting end 912 and a body or body portion 914 that has a distal end 924. The mounting end 912 can be fixedly coupled to a band portion, be integrally formed with a band portion, or movably coupled to a band portion using a connector inserted through an opening or hole 913. The body 914 includes two substantially linear portions 914a and 914c and a curved portion 914b. As shown, in one embodiment, the body 914 has a frusto-conical configuration. In other embodiments, the body 914 can have a different configuration or shape. The body 914 has an inner surface 916 facing the wearer and an outer surface 918 oriented away from the wearer. The body 914 also includes an edge 926 that defines an opening 928 through the body 914.

[0117] As shown in Figs. 17-22, the electronic device 940 includes a coupling mechanism 970 that is formed with the housing 950. The coupling mechanism 970 includes two arm portions

972 and 974 that include slots 976 and 978, respectively. The slots 976 and 978 are angled relative to the housing 950 and configured to receive portions 914a and 914c of the body 914. In this embodiment, the portions 914a and 914c are slid into the slots 976 and 978 and retained therein via a friction fit.

[0118] Referring to Figs. 20-22, housing 950 includes an outer side 952, an opposite, inner side 954, and several side walls 956, 958, 960, and 962. The output housing 980 includes an inner surface 982 oriented toward the user with openings 986 formed therein, and a side wall 984 that extends around the housing 980. As shown in Fig. 20, the link 990 is flexible which allows the speaker housing 980 to move relative to the housing 950 between different positions 942 and 944 which result in the electronic device 940 having different configurations. The adjustability of the link 990 allows the electronic device 940 to fit in and be used in different shaped ear portions.

[0119] Referring to Figs. 23 and 24, an alternative embodiment of an ear covering device is illustrated. In this embodiment, the ear covering device 1000 includes ear portions 1010 and 1012 and a middle portion 1014 located between the ear portions 1010 and 1012. Fig. 23 shows the ear covering device 1000 being worn around the back of the head of a user. The ear portions 1010 and 1012 can be referred to as a first ear portion 1010 and a second ear portion 1012. The ear covering device 1000 has an inner surface 1016 that is directed toward and at least part of which is in contact with the head of the wearer and an opposite, outer surface 1018 that is oriented outwardly from the head of the wearer. The ear covering device 1000 includes a shell 1100 that has an interior region in which a frame is located. The frame can be an adjustable length frame or a fixed length frame.

[0120] Ear covering device 1000 includes an electronic system 1025 that can be used by the wearer to generate various outputs such as music, to talk on a phone, or to communicate with others. The electronic system 1025 is coupled to the shell 1100 of the ear covering device 1000. In this embodiment, the electronic system 1025 includes an electronic component 1030 with a control portion 1031 that is accessible on the outside of the shell 1100 of the ear covering device 1000 on the ear portion 1012 of the ear covering device 1000. The other ear portion 1014 of the ear covering device 1000 does not include any portion of the electronic system 1025 that is accessible from the outside of the shell 1100. The electronic component 1030 is a BLUETOOTH enabled communication device with a headphone.

[0121] As shown in Fig. 23, the electronic component 1030 has a control portion 1031 that includes several switches 1034, 1036, 1038, 1040, and 1042. The control portion 1031 includes a plate-like structure 1046 that has several switches located beneath it, each of which is closed or actuated when a corresponding portion of the plate-like structure 1046 is pressed. For example, switch 1034 can be used to increase the volume of the generated output and switch 1038 can be used to decrease the volume. Switch 1036 can be pressed to advance or index to the next audio file, such as a song, on a remote electronic device. Switch 1040 can be pressed to return or index to the previous audio file. Finally, switch 1042 can be pressed to answer a phone that has been electronically connected to the electronic system or device 1025 using a wireless technology, such as BLUETOOTH technology or IR technology. In other embodiments, the functionality and arrangement of the different switches can vary. As described in detail below, the ear covering 1000 includes a mounting portion or coupler 1044 that is used to couple the electronic component 1030 to the shell 1100.

[0122] Referring to Fig. 25, a view of the outer surface of the shell 1100 of the ear covering device 1000 is shown in a planar configuration. The shell 1100 includes an exterior or outer surface 1102 that is defined by an outer fabric member 1110. Referring to Fig. 26, a view of the inner surface 1104 of the shell 1100 of the ear covering device 1000 is shown in a planar configuration. As shown, the shell 1100 includes several inner fabric members 1120, 1130, and 1140. In this embodiment, the outer surface of the shell 1100 is defined by the four fabric members 1110, 1120, 1130, and 1140. A binding material 1150 is located around the perimeter of the shell 1100 and stitching 1152 is used to couple the binding 1150 and the members 1110, 1120, 1130, and 1140.

[0123] An inside view of an alternative embodiment of a shell is illustrated in Fig. 27. In this embodiment, the shell 1240 includes an outer fabric member (not shown) that is similar to outer fabric member 1110. The shell 1240 also includes a single inner fabric member 1242 that forms the inner surface of the shell 1240. A binding 1244 is provided around the outer perimeter edges of the fabric members 1242 and coupled thereto using stitching 1246.

[0124] Referring to Figs. 28-31, the various components of the shell 1100 are illustrated. As shown, the outer fabric member 1110 includes ear portions 1112 and 1114, and a middle portion 1116 located between the ear portions 1112 and 1114. The ear portion 1112 has a substantially circular outer edge or perimeter for part of the ear portion 1112. Similarly, ear portion 1114 has a similar substantially circular outer edge or perimeter. The middle portion 1116 is narrower than the ear portions 1112 and 1114. The outer fabric member 1110 includes an outer edge 1118 that defines a perimeter 1119 of the member 1110.

[0125] Referring to Fig. 29, an embodiment of the shell liner 1160 is illustrated. The shell liner 1160 is located in the interior region of the shell 1100. The shell liner 1160 includes ear

portions 1162 and 1164 and a middle portion 1166 located between the ear portions 1162 and 1164. The ear portions 1162 and 1164 and middle portion 1166 have configurations that are substantially similar to the configurations of the ear portions 1112 and 1114 and middle portion 1116, respectively. Ear portion 1162 of the shell liner 1160 includes an inner edge 1168 that defines an opening 1170 that extends through the shell liner 1160. Similarly, ear portion 1164 of the shell liner 1160 includes an inner edge 1172 that defines an opening 1174 that extends through the shell liner 1160. Each of the openings 1170 and 1174 is configured and sized to receive part of one of the portions of the electronic device 1030 therein, as described in detail below. While the openings 1170 and 1174 are circular, the openings 1170 and 1174 can have any shape or configuration. The shell liner 1160 includes an outer edge 1176 that defines a perimeter 1178 of the shell liner 1160.

[0126] Referring to Fig. 30, several components of the shell 1100 of the shell 1100 are illustrated. In shell 1100, ear portion liners 1190 and 1192 are included for extra warmth in the ear portion areas of the shell 1100. In different embodiments, the shell 1100 may include additional liner materials as desired.

[0127] Referring to Fig. 31, an exploded view of the components of the shell 1100 is illustrated. As shown, the shell 1100 includes an outer membrane 1110, and inner membranes 1120, 1130, and 1140 which form the inner surface of the shell 1100. As noted above, the shell 1100 also includes the shell liner 1160 with openings 1170 and 1174, and ear portion liners 1190 and 1192. In alternative embodiments, some of those components that form a shell of the ear covering device can vary.

[0128] In Fig. 32, an exploded view of various components of the ear covering device 1000 is illustrated. The inner most layer of the ear covering device 1000 is formed by the inner fabric

members 1120, 1130, and 1140. Members 1130 and 1140 are ear portions and member 1120 is a central or middle portion. Adjacent to ear portion members 1130 and 1140 are ear portion liners 1190 and 1192.

[0129] Next to the ear portion liners 1190 and 1192 and inner fabric member 1120 is a frame 1200. The frame 1200 includes a band 1210 and ear portions 1220 and 1230 coupled to the band 1210. In this embodiment, the band 1210 includes band portions 1212 and 1214 that are slidably coupled together, thereby allowing adjustment in the length of the band 1210. In other embodiments, the band 1210 may be formed of a single band portion or one or more band portions that are fixedly coupled together, thereby rendering the length of the band fixed.

[0130] The shell 1100 also includes a shell liner 1160 adjacent to the frame 1200. In this embodiment, the shell liner 1160 includes openings 1170 and 1174 formed therein that receive a portion of either the speaker housings 1330 and 1090 or the electronic components to which the speaker housings 1330 and 1090 are coupled. The speaker housings 1090 and 1330 are BLUETOOTH enabled headphones, one of which is configured to communicate with a remote electronic device. The BLUETOOTH components are available from Suicen. Thus, the portion of the electronic component 1030 that contains speaker housing 1090 and the portion of the other electronic component that contains speaker housing 1330 are coupled to the shell liner 1160, as described below. The speaker housings 1330 and 1090 are connected to each other by a wire 1350. In another embodiment, the shell liner 1160 does not include openings 1170 and 1174. In that embodiment, the shell 1100 includes two fabric members 1194 that are coupled to the shell liner 1160, such as by stitching, to form a pouch or pocket to retain each speaker housing in a position relative to the shell liner 1160 and the corresponding ear of the wearer. The shell 1100 also includes an outer fabric member 1110 as previously discussed.

[0131] Referring to Figs. 34-41, an embodiment of an electronic component is illustrated. In this embodiment, the electronic component 1030 includes a control portion 1031 including a housing 1032 with switches 1034, 1036, 1038, 1040, and 1042 as previously described. The electronic component 1030 also includes a ring 1050 that surrounds the housing 1032. The ring 1050 includes a stepped portion 1052 with an upper surface 1054 and a tapered surface 1056 (best seen in Fig. 38 noting that the housing 1032 has been removed in Figs. 37 and 38 for ease of reference). Referring to Fig. 38, the ring 1050 has an edge 1058 that forms an opening 1060 in an upper surface of the ring 1050. The ring 1050 also includes an opening 1062 formed therein proximate to which a microphone or input device (not shown) can be located. Thus, when the wearer of the ear covering device 1000 speaks, the microphone detects and receives the voice of the wearer and surrounding sounds. The electronic component 1030 includes the housing 1032 located in the opening 1060.

[0132] As shown in Figs. 35-38, the ring 1050 also includes a flange 1070 that has an outer perimeter 1072 and an outer surface 1074 and an opposite, inner surface 1076. On the inner side of the ring 1050 there is a wall 1078 that has a surface 1080 that forms a receptacle 1082 that receives a speaker housing, such as speaker housing 1090, as described below. Referring to Fig. 39, the speaker housing 1090 can include an inner surface 1092 directed toward the head of the wearer and a side wall 1096 extending around the speaker housing 1090. The inner surface 1092 includes several holes or openings 1094 formed therein.

[0133] Referring to Figs. 40 and 41, the speaker housing 1090 has been inserted into the receptacle 1082 formed on the ring 1050. In one embodiment, the housing 1032 extends slightly above the upper surface 1054 of the ring 1050 to facilitate contact and use by the wearer of the ear covering device 1000. Fig. 41 is a lower perspective view showing the inner side of the

speaker housing 1090 and the ring 1050. As shown, the ring 1050 includes a sleeve 1084 with an opening 1086 formed therein. The opening 1086 is configured to receive a wire or connector that is coupled to a microphone and/or the internal electronic components of the housing 1032 at one end and that is directed to the other speaker housing 1330.

[0134] Referring to Figs. 42-44, the other electronic component 1290 of the electronic system 1025 is illustrated. The electronic component 1290 is located in the opposite ear portion of the ear covering device 1000 from electronic component 1030. In Fig. 42, a perspective view showing the outer side of this electronic component 1290 is shown. The electronic component 1290 includes a housing 1300 with an outer surface 1302. However, unlike electronic component 1030, the outer surface 1302 of housing 1300 does not include any switches. In this embodiment, the outer surface 1302 of the housing 1300 is non-functional and in addition, not exposed externally of the shell 1100. Thus, electronic component 1290 is contained within the shell 1100 and in particular, within the ear portion 1014 of the shell 1100.

[0135] The housing 1300 includes a ring 1304 with a stepped portion 1306 having surfaces 1307 and 1308 and an edge 1309A that defines an opening 1309B. The ring 1304 includes a flange 1310 with a perimeter 1312 and an outer surface 1314 and an opposite, inner surface 1316.

[0136] As shown in Figs. 43 and 44, the ring 1304 includes a wall 1318 with an inner surface 1320 that defines a receptacle 1322 into which the speaker housing 1330 can be inserted and retained via a friction fit. The speaker housing 1330 has an inner surface 1332 oriented toward the user that has several holes or openings 1334. As shown in Fig. 43, the speaker housing 1330 includes an opening 1336 into which the end of wire or connector 1350 from electronic component 1030 is inserted to connect the electronic components 1030 and 1290 together.

[0137] Referring to Fig. 45, some components of an embodiment of an ear covering device are illustrated. In this embodiment, the ear covering device 1400 includes a fabric shell with an outer fabric member 1410 with an outer surface 1412 and an opposite, inner surface 1414. The outer fabric member 1410 has an edge 1416 that defines a circular or substantially circular opening 1418. In addition, the shell of the ear covering device 1400 includes a shell liner 1420 with an outer surface 1422 and an opposite, inner surface 1424. The shell liner 1420 has an edge 1426 that defines a circular or substantially circular opening 1428. It is to be understood that only a portion of the ear covering device 1400 is illustrated in Fig. 45 for ease of reference.

[0138] The ear covering device 1400 includes a coupling member or eyelet 1430 that is coupled to the outer fabric member 1410. The coupling member can be referred to alternatively as a mount, a coupler, or a mounting component. The eyelet 1430 can be coupled to the outer fabric member 1410 via direct inject molding. The eyelet 1430 has a surface 1432 that defines an opening 1434 extending through the eyelet 1430. The eyelet 1430 has a surface 1436 that is in contact with the outer fabric member 1410.

[0139] The ear covering device 1400 includes an electronic component 1450 as shown in Fig. 45. The electronic component 1450 corresponds to the electronic component 1030 previously described in that it contains a control portion 1464. The electronic component 1450 includes a mounting structure 1460 including a flange 1462 with the control portion 1464 being accessible by the wearer of the ear covering device 1400. The mounting structure 1460 includes an opening 1466 associated with a microphone (not shown). A speaker housing 1470 is coupled to the mounting structure 1460 via a friction fit.

[0140] When the components in Fig. 45 are assembled, the control portion 1464 extends into the opening 1434 of the eyelet 1430 and the speaker housing 1470 extends into the opening 1428

of the shell liner 1420. The opening 1434 may be sized so that the portion of the mounting structure 1460 that extends into the opening 1434 engages the surface 1432 of the eyelet 1430. The flange 1462, as well as the rest of the mounting structure 1460, is formed of a molded plastic material. Accordingly, the flange 1462 can be coupled to the shell liner 1420 via stitching 1480, thereby holding the electronic component 1450 in place within the shell of ear covering device 1400. The stitching 1480 can be located around the perimeter of the flange 1462 or only a portion of the perimeter, as desired.

[0141] Referring to Figs. 46 and 47, some components of an embodiment of an ear covering device are illustrated. In this embodiment, the ear covering device 1500 includes a fabric shell with an outer fabric member 1510 with an outer surface 1512 and an opposite, inner surface 1514. The outer fabric member 1510 has an edge 1516 that defines a circular or substantially circular opening 1518. In addition, the fabric shell of the ear covering device 1500 includes a shell liner 1520 with an outer surface 1522 and an opposite, inner surface 1524. The shell liner 1520 has an edge 1526 that defines a circular or substantially circular opening 1528. It is to be understood that only a portion of the ear covering device 1500 is illustrated in Fig. 46 for ease of reference.

[0142] The ear covering device 1500 includes a coupling member or eyelet 1530 that is coupled to the outer fabric member 1510. The eyelet 1530 can be coupled to the outer fabric member 1510 via direct inject molding. Alternatively, the eyelet 1530 can be coupled to the outer fabric member 1510 using an adhesive or other coupling technique or mechanism. The eyelet 1530 has a body 1532 with a surface 1534 that defines an opening 1536 extending through the eyelet 1530. The eyelet 1530 has a projection or ridge 1538 that extends into the opening 1536. The eyelet 1530 also includes a recess or groove 1540 extending around the outer

perimeter of the body 1532 that can be used to couple the eyelet 1530 to the outer fabric member 1510.

[0143] The ear covering device 1500 includes an electronic component 1550 as shown in Fig. 46. The electronic component 1550 corresponds to the electronic component 1030 previously described. The electronic component 1550 includes a mounting structure 1560 with a flange 1562 and a control portion 1564 that is accessible by the wearer of the ear covering device 1500. The mounting structure 1560 includes an opening 1566 associated with a microphone (not shown). A speaker housing 1580 is coupled to the mounting structure 1560 via a friction fit. As shown, the mounting structure 1560 also includes a side wall 1568 that defines a groove 1570 that extends around the mounting structure 1560.

[0144] When the components in Fig. 46 are assembled, the control portion 1564 extends into the opening 1534 of the eyelet 1530 and the speaker housing 1580 extends into the opening 1528 of the shell liner 1520. The opening 1534 may be sized so that the portion of the mount 1560 that extends into the opening 1534 engages the surface 1532 of the eyelet 1530. The flange 1562, as well as the rest of the mounting structure 1560, is formed of a molded plastic material. Accordingly, the flange 1562 can be coupled to the shell liner 1520 via stitching 1590, thereby holding the electronic component 1550 in place within the shell. The stitching 1590 can be located around the perimeter of the flange 1562 or only a portion of the perimeter, as desired.

[0145] When the electronic component 1550 is inserted into the opening 1536 of the eyelet 1530, the electronic component 1550 is moved until the projection or ridge 1538 engages the groove 1570 in the side wall 1568. When the projection 1538 engages the groove 1570, a positive engagement occurs and the electronic component 1550 is coupled to the outer fabric member 1510 via the eyelet 1530. The opening 1566 for a microphone is positioned so that it is

not covered by the eyelet 1530 when the electronic component 1550 is coupled to the eyelet 1530.

[0146] In this embodiment, the flange 1562 is located on the inside of the outer fabric member 1510 and accordingly, is in the interior of the shell 1501. In an alternative embodiment, the projection 1538 can be replaced by a groove and the groove 1570 can be replaced by a projection.

[0147] Referring to Figs. 48 and 49, some components of an alternative embodiment of an ear covering device are illustrated. In this embodiment, the ear covering device 1600 includes a shell, of which only outer fabric member 1610 is illustrated for ease of reference. The outer fabric member 1610 has an outer surface 1612 and an opposite, inner surface 1614. The outer fabric member 1610 also includes an edge 1616 that defines an opening 1618. The ear covering device 1600 includes a coupling member or an eyelet 1630 that has a surface 1632 defining an opening 1634 into which a projection or ridge 1636 extends. In one embodiment, the coupling member 1630 includes a groove or recess 1638 that facilitates the coupling of the coupling member 1630 to the outer fabric member 1610. The coupling member 1630 can be coupled to the outer fabric member 1610 via direct inject molding.

[0148] As shown in Fig. 48, an electronic component 1650 is inserted into the opening 1634 of the eyelet 1630 to couple the electronic component 1650 to the shell 1601. The electronic component 1650 includes a mounting structure 1660 with a flange 1662. A control portion 1664 with several switches extends outwardly from the mount 1660. A speaker housing 1680 extends from an opposite side of the mounting structure 1660. In this embodiment, the mounting structure 1660 includes a side wall 1666 that has a groove or recess 1668 formed therein. The groove 1668 is sized to receive the projection 1636 of the eyelet 1630 to couple the electronic

component 1650 to the shell, and in particular, to the outer fabric member 1610, as shown in Fig. 49.

[0149] In different embodiments, ear covering devices may not include a waterproof or weather resistant housing for any of the electronic components. In alternative embodiments, the quantity, location, and functionality of the controls can vary. In addition, the connections between different electronic components of an ear covering device may be via wired or wireless.

[0150] In alternative embodiments, the location of the controls can vary. In addition, some of the electronic components can be mounted to part of the frame. For example, some of the electronic components of the ear covering device can be mounted to part of the frame, such as a middle portion or an ear portion, using a structure such as a clip.

[0151] The fabric materials for the shells of the ear covering devices can vary in different embodiments. In one embodiment, the outer fabric member is Polartec Wind Pro material and the inner fabric members are Polartec Power Dry material, each of which is available from Malden Mills. The shell liner and ear portion liners can be a fleece material. The frame can be molded plastic material. The entire disclosures of each of U.S. Patent Nos. 5,835,609, 6,332,223, 6,499,146, 6,507,247, 6,502,248, and 6,735,784 is incorporated by reference herein in its entirety.

[0152] In one embodiment, the shell of the ear covering device may include a THERMOLITE fabric piece on one side of a headphone and a mesh fabric piece on an opposite side of a headphone, with the fabric pieces being coupled to together at several different locations to form a pouch.

[0153] Thus, it is intended that the present invention cover the modifications and variations of this invention. For example, it is to be understood that terms such as “left,” “right,” “top,” “bottom,” “front,” “rear,” “side,” “height,” “length,” “width,” “upper,” “lower,” “interior,” “exterior,” “inner,” “outer,” and the like as may be used herein, merely describe points of reference and do not limit the present invention to any particular orientation or configuration.

[0154] While the invention has been described in detail and with references to specific embodiments thereof, it will be apparent to one skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope thereof. Thus, it is intended that the present invention covers the modifications and variations of this invention.

What is claimed is:

1. An ear covering device comprising:
a frame;
a fabric shell, the fabric shell being configured to cover a portion of the frame; and
an electronic system, the electronic system being configured to communicate wirelessly with an electronic device.
2. The ear covering device of claim 1, wherein the electronic system is coupled to the fabric shell.
3. The ear covering device of claim 1, wherein the electronic system includes an input device and an output device.
4. The ear covering device of claim 1, wherein the frame is configured to extend around the back of a head of a wearer of the ear covering device.
5. The ear covering device of claim 1, wherein the fabric shell includes a coupler and the electronic system includes an electronic component that is coupled to the coupler of the fabric shell.

6. The ear covering device of claim 1, wherein the fabric shell includes a first ear portion, a second ear portion, and a middle portion located between the first ear portion and the second ear portion, and the electronic system includes a first speaker housing and a second speaker housing, the first speaker housing being proximate to the first ear portion of the fabric shell, and the second speaker housing being proximate to the second ear portion of the fabric shell.

7. The ear covering device of claim 6, wherein the first speaker housing is connected to the second speaker housing by a wire.

8. The ear covering device of claim 6, wherein the electronic system includes a first electronic component and a second electronic component, the first electronic component including the first speaker housing and the second electronic component including the second speaker housing, the first electronic component being accessible externally of the fabric shell, and the second electronic component being disposed internally of the fabric shell.

9. The ear covering device of claim 6, wherein the fabric shell includes an outer fabric member and a shell liner, each of the first speaker housing and the second speaker housing being coupled to the shell liner.

10. The ear covering device of claim 9, wherein the shell liner includes a first opening and a second opening, the first speaker housing is engaged with the first opening of the shell liner and the second speaker housing is engaged with the second opening of the shell liner.

11. The ear covering device of claim 9, wherein the first electronic component is coupled to the shell liner by stitching and the second electronic component is coupled to the shell liner by stitching.

12. An ear covering device to be worn by a user around a back of a head of the user, the ear covering device comprising:

a frame including a first ear portion, a second ear portion, and a band portion coupled to the first ear portion and to the second ear portion;

a fabric shell forming an interior region, at least a portion of the frame being disposed in the interior region of the fabric shell; and

an electronic system being configured to communicate wirelessly with an electronic device, the electronic system being coupled to one of the frame or the fabric shell.

13. The ear covering device of claim 12, wherein the electronic system includes a first electronic component including a first transducer and a second electronic component including a second transducer, the first electronic component and the second electronic component being connected to each other.

14. The ear covering device of claim 13, wherein the first transducer is located proximate to the first ear portion of the frame and the second transducer is located proximate to the second ear portion of the frame.

15. The ear covering device of claim 13, wherein the first electronic component includes a control portion for controlling the operation of the electronic system, the control portion being accessible outside of the fabric shell.
16. The ear covering device of claim 13, wherein the first electronic component is accessible outside of the fabric shell and the second electronic component is disposed entirely within the interior region of the fabric shell.
17. The ear covering device of claim 13, wherein the fabric shell includes a first ear portion, a second ear portion, and a middle portion located between the first ear portion of the fabric shell and the second ear portion of the fabric shell, the fabric shell including a mounting component coupled to the first ear portion of the fabric shell, the mounting component receiving the first electronic component and coupling the first electronic component to the fabric shell.
18. The ear covering device of claim 17, wherein the mounting component is an eyelet with an opening and a projection extending into the opening, the first electronic component includes a groove, and the projection of the eyelet engages the groove of the first electronic component when the first electronic component is coupled to the mounting component.
19. The ear covering device of claim 18, wherein the fabric shell includes an outer fabric member defining an opening and the eyelet is disposed proximate to the opening in the outer fabric member.

20. An ear covering configured to be worn by a user around a back of a head of the user, the ear covering device comprising:

a frame including a first ear portion, a second ear portion, and a band portion coupled to the first ear portion and to the second ear portion;

a fabric shell including a first ear portion, a second ear portion, and a middle portion coupled to the first ear portion of the fabric shell and to the second ear portion of the fabric shell, the fabric shell forming an interior region, the frame being disposed in the interior region of the fabric shell, the fabric shell including a shell liner disposed within the interior region; and

an electronic system being configured to communicate wirelessly with an electronic device, the electronic system including:

a first electronic component disposed proximate to the first ear portion of the frame and the first ear portion of the fabric shell, the first electronic component including a transducer for generating audible outputs, the first electronic component including a control portion for controlling the operation of the electronic system, the first electronic component being coupled to the shell liner; and

a second electronic component disposed proximate to the second ear portion of the frame and the second ear portion of the fabric shell, the second electronic component connected to the first electronic component via a wire, the second electronic component being coupled to the shell liner.

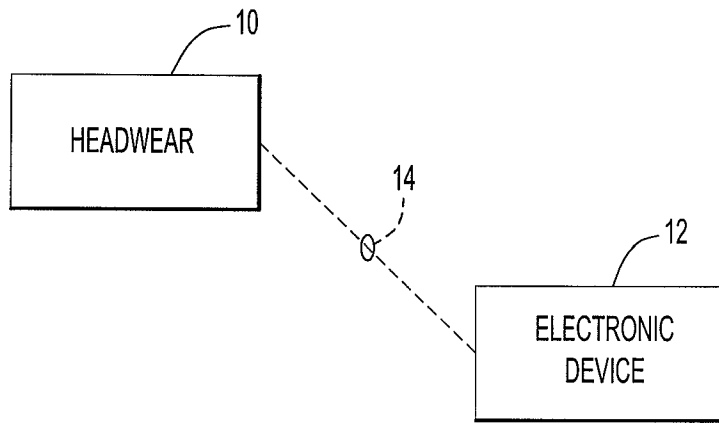


FIG.1

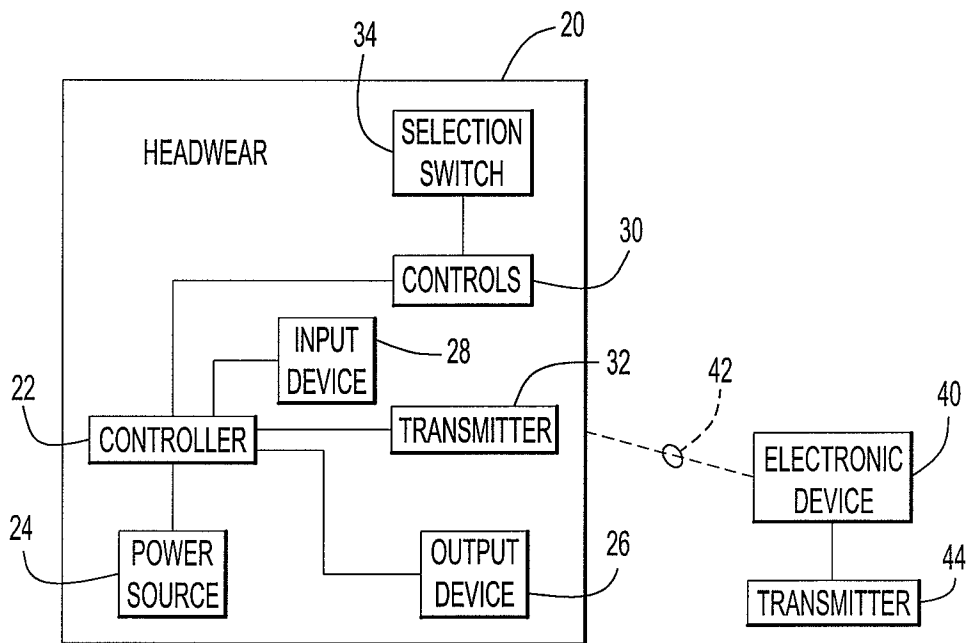


FIG.2

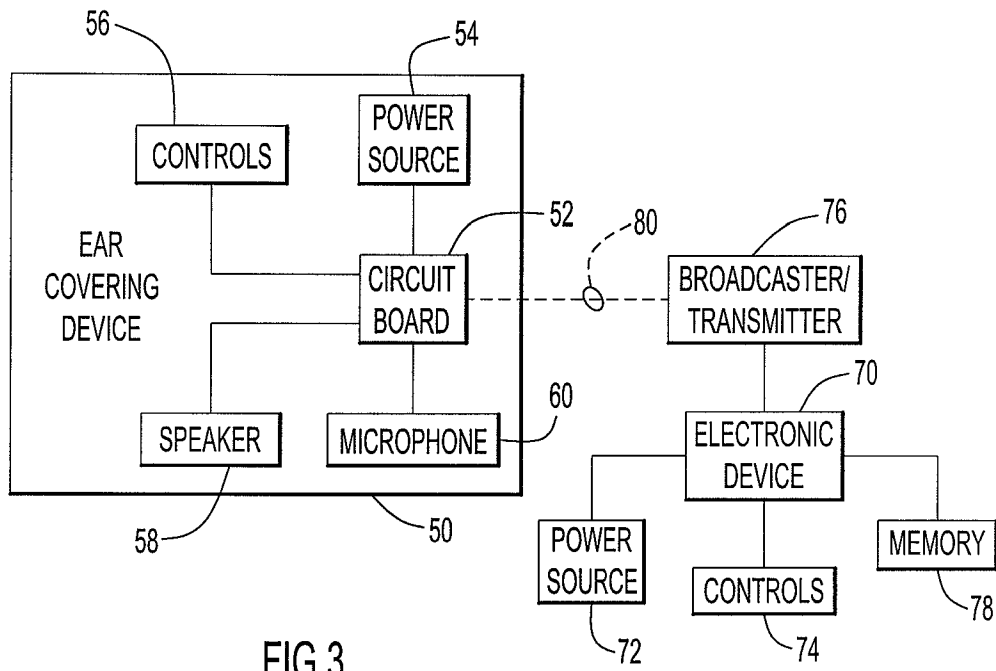


FIG.3

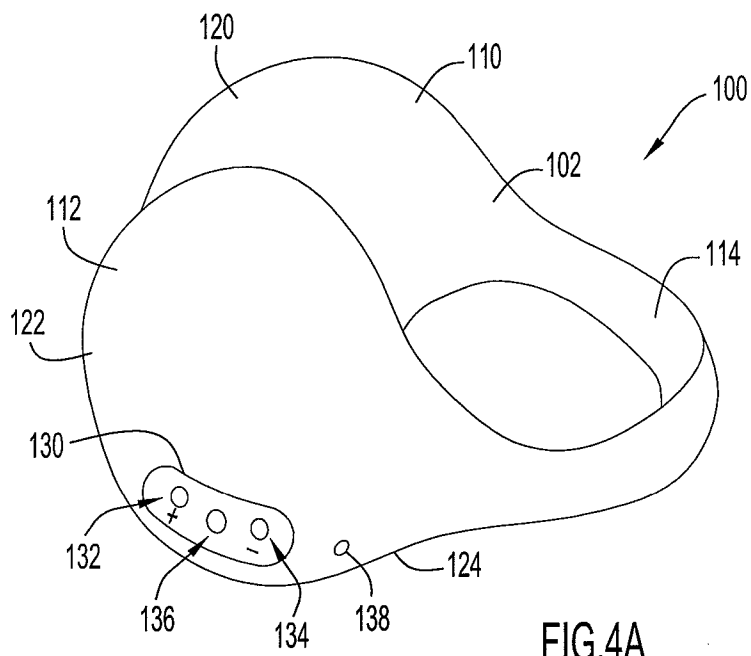
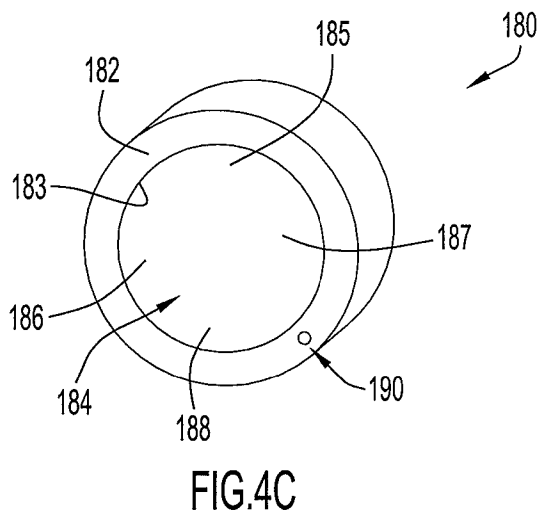
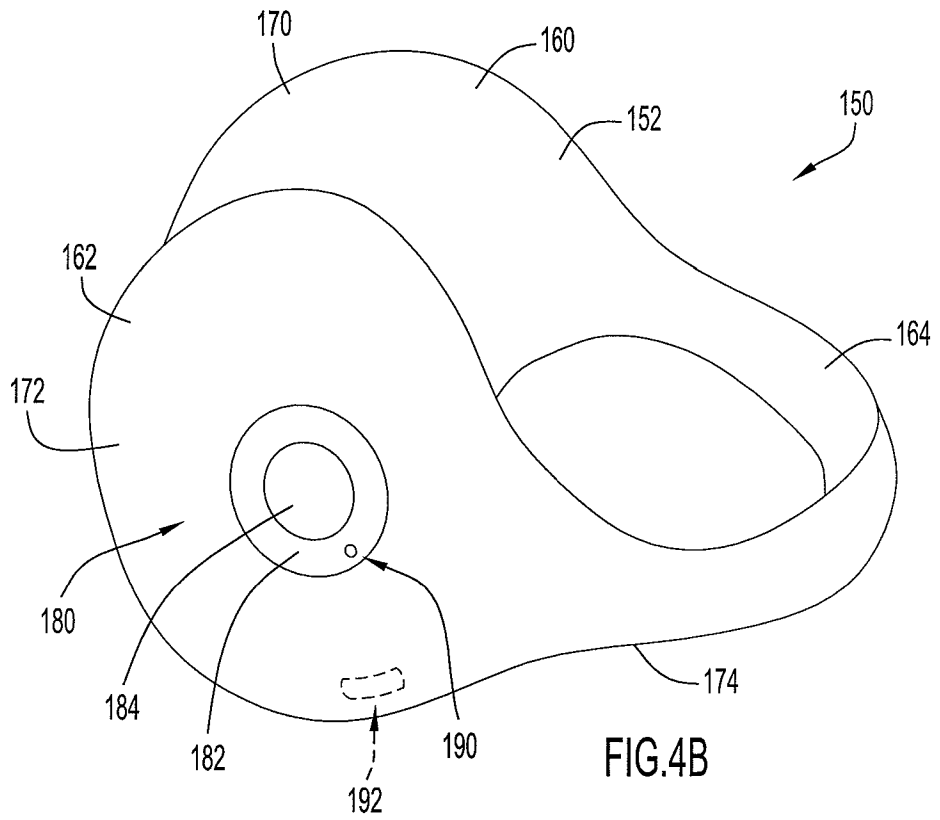
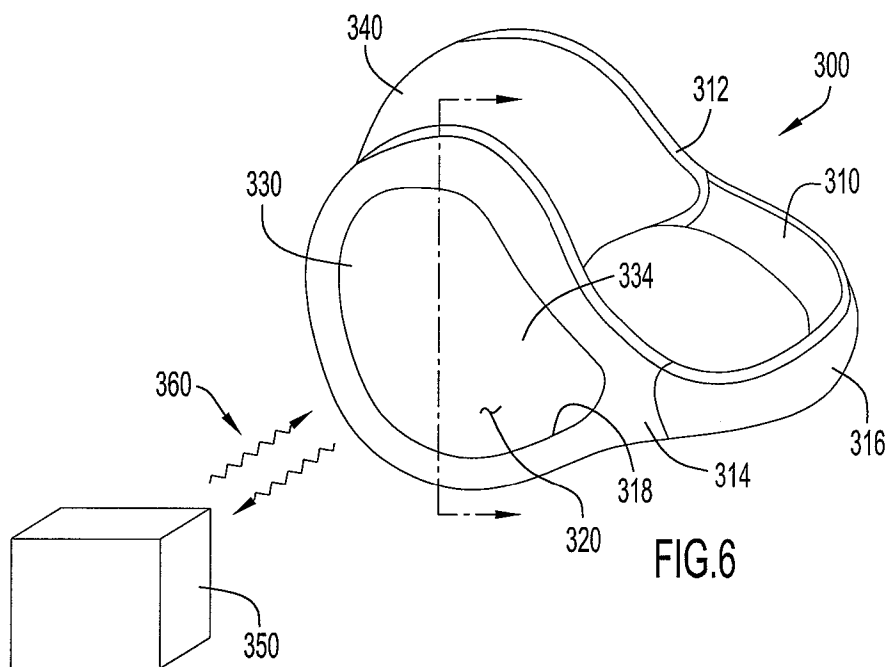
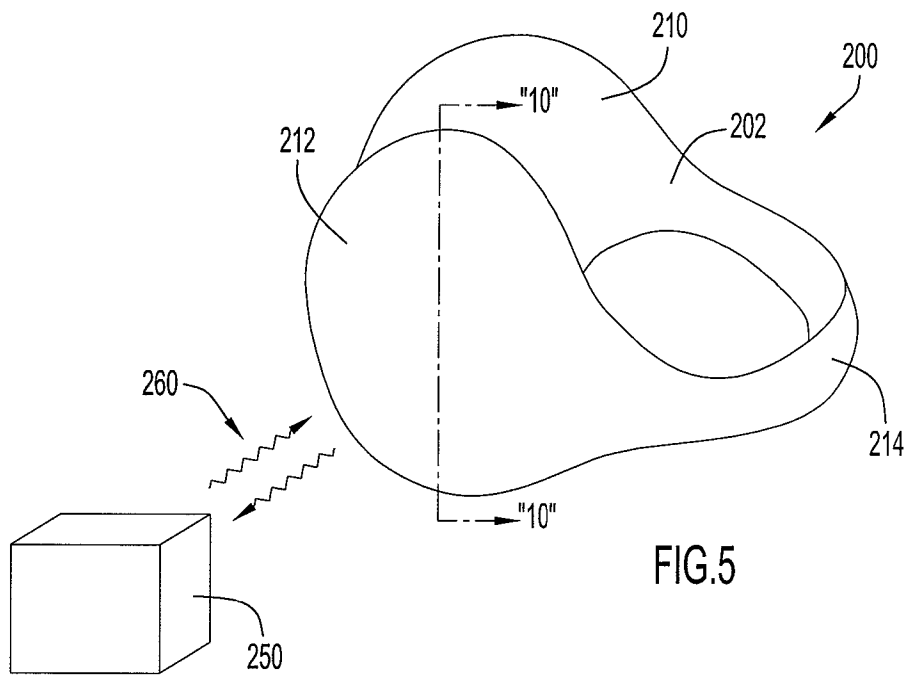


FIG.4A



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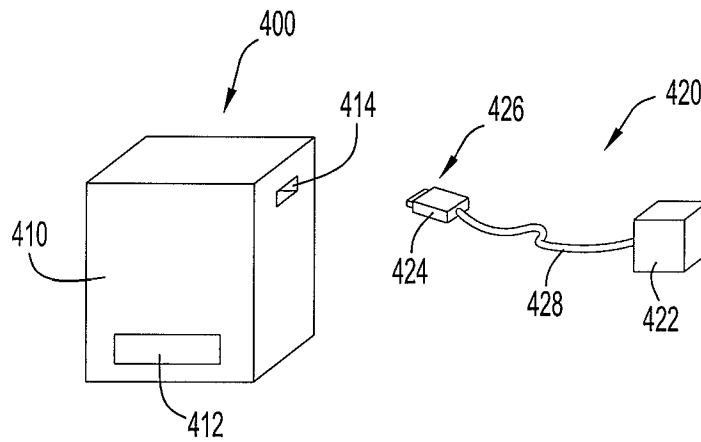
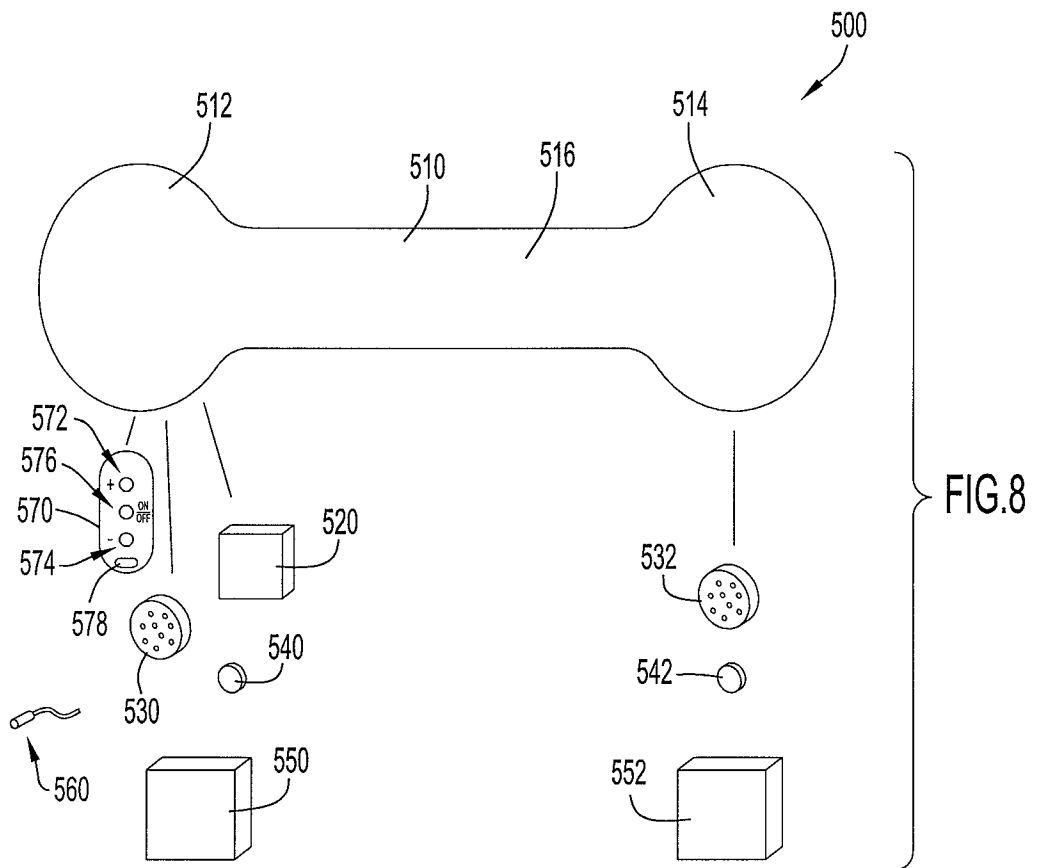


FIG. 7



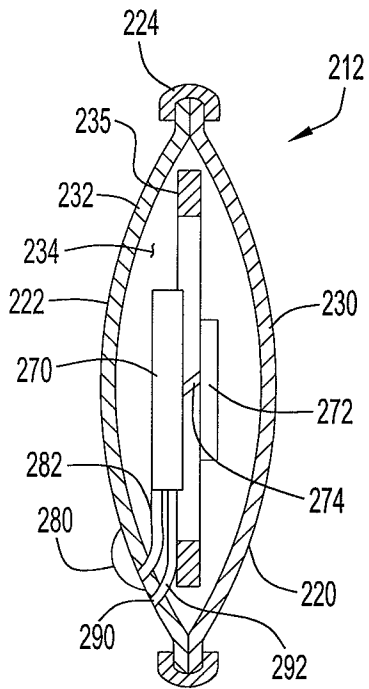


FIG. 10

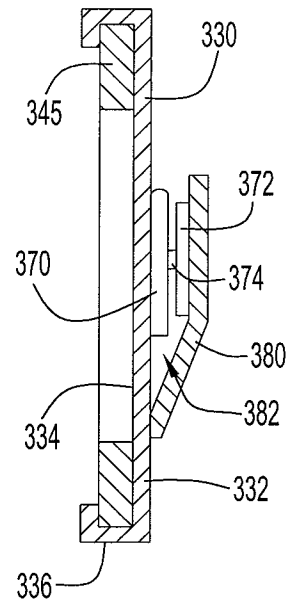


FIG. 11

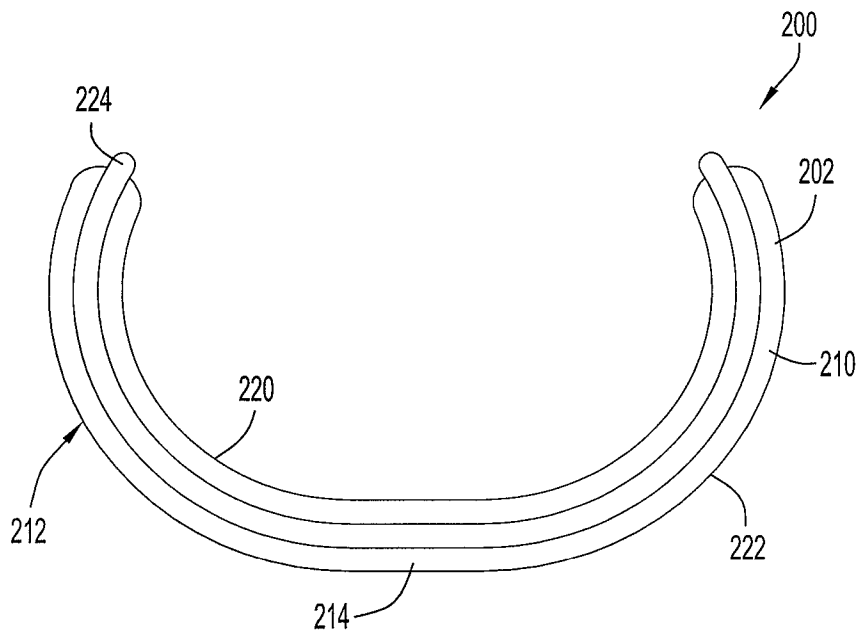


FIG. 9

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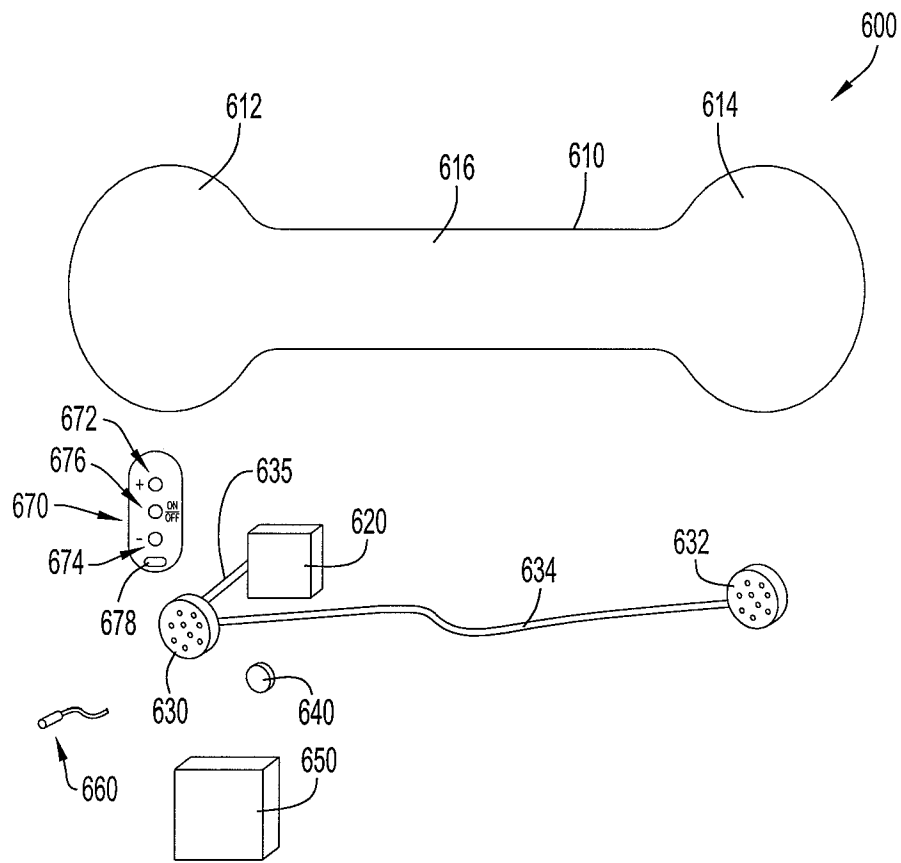


FIG.12

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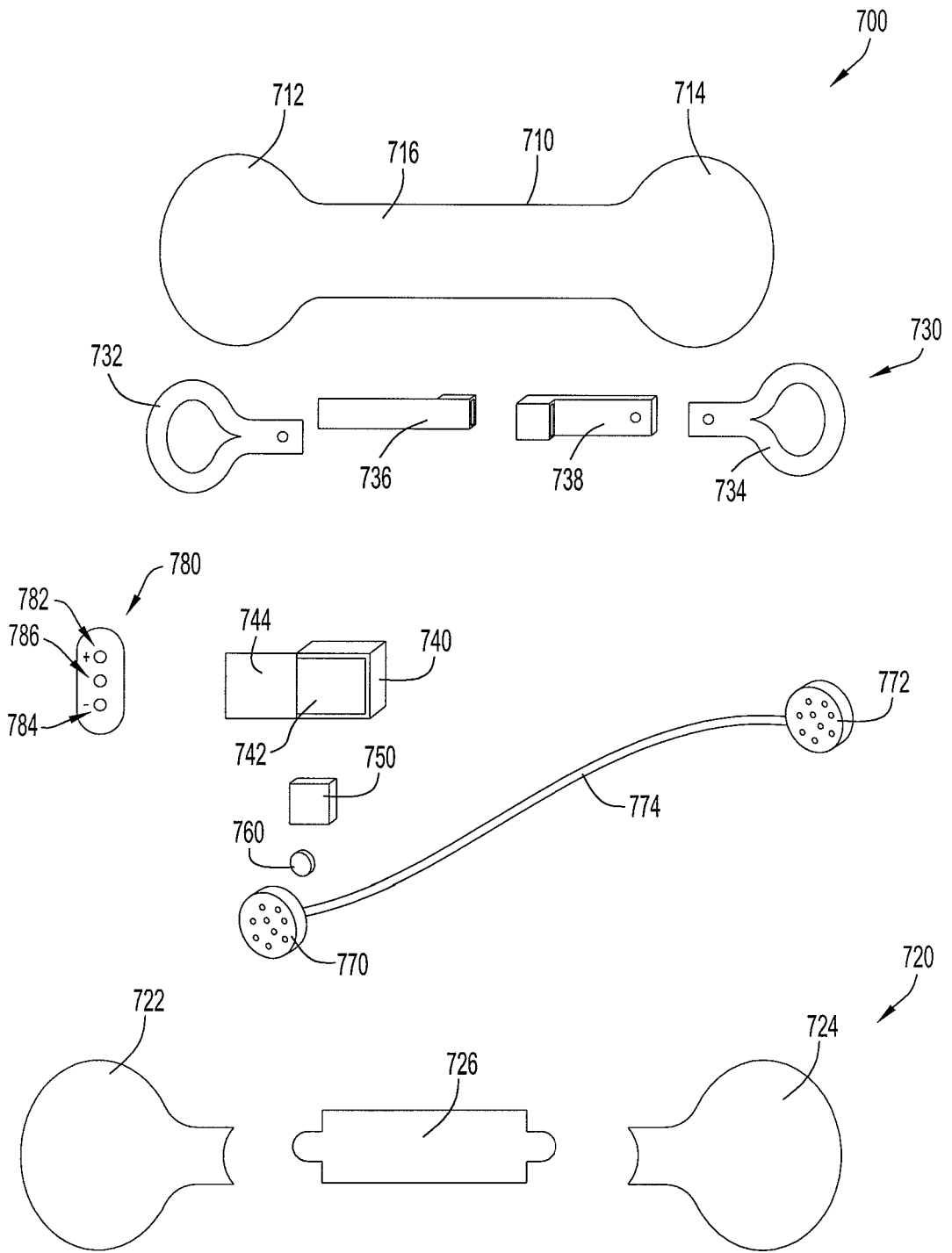


FIG.13

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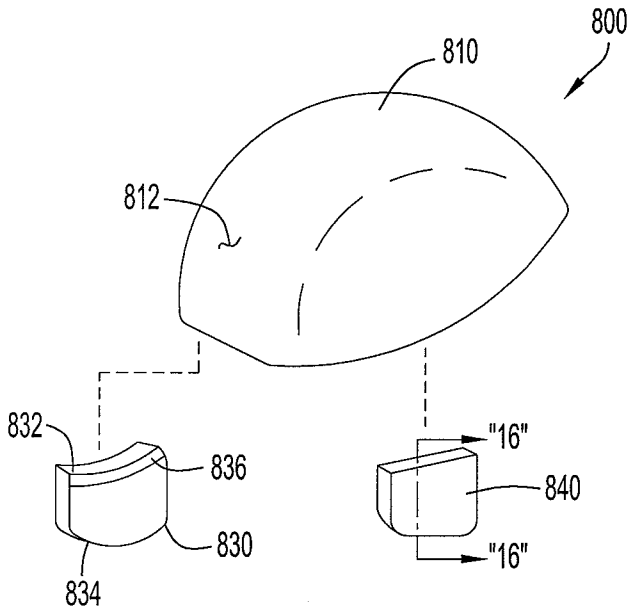


FIG.14

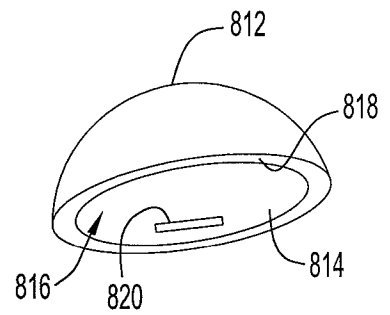


FIG.15

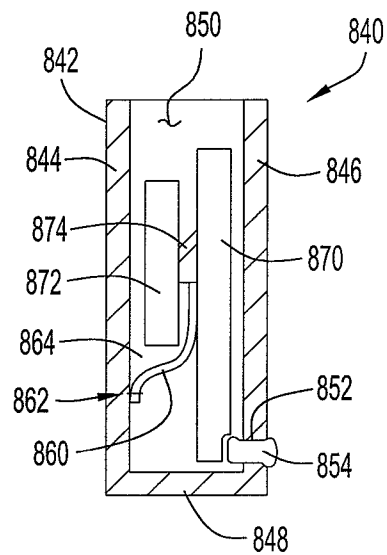


FIG.16

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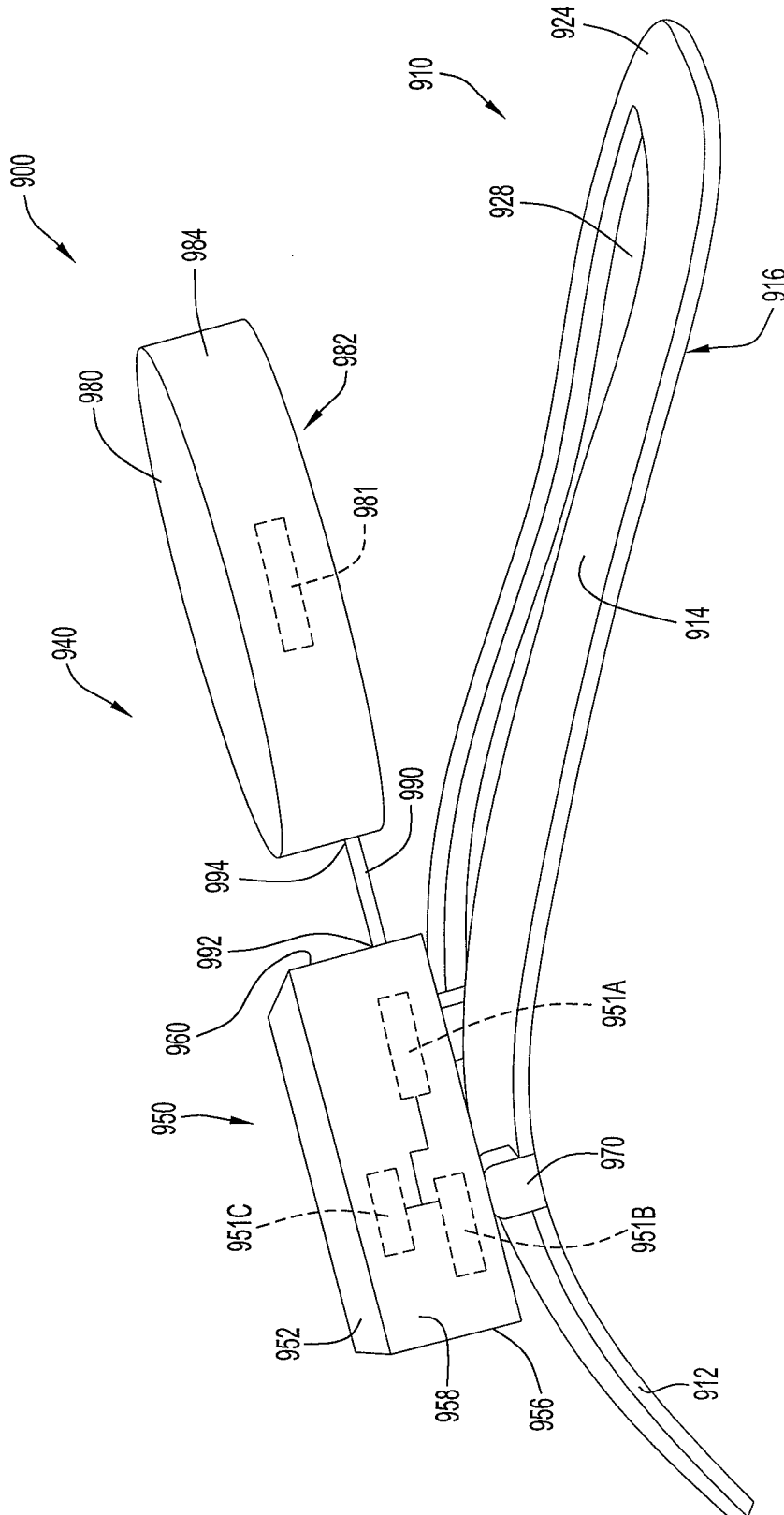


FIG. 17

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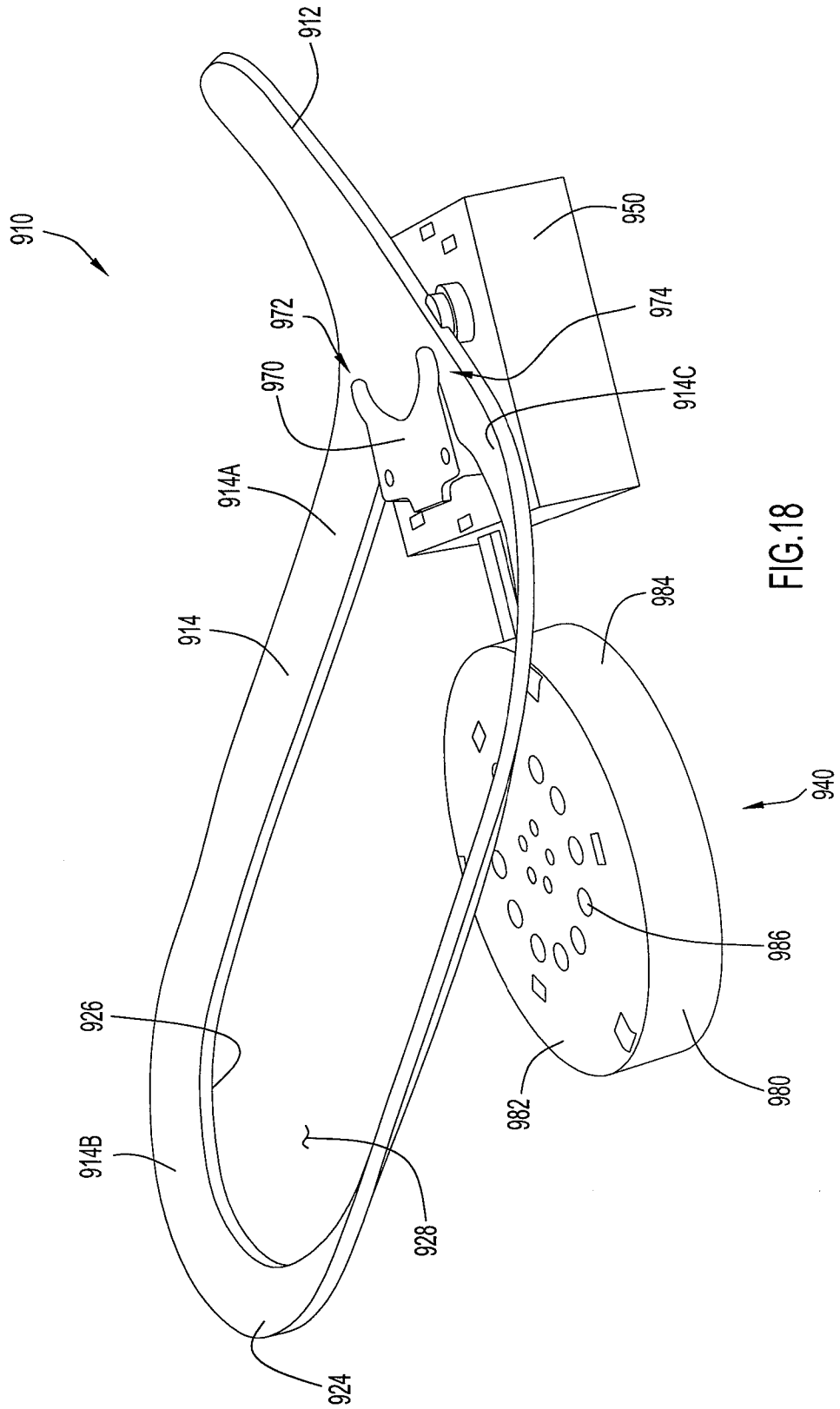


FIG.18

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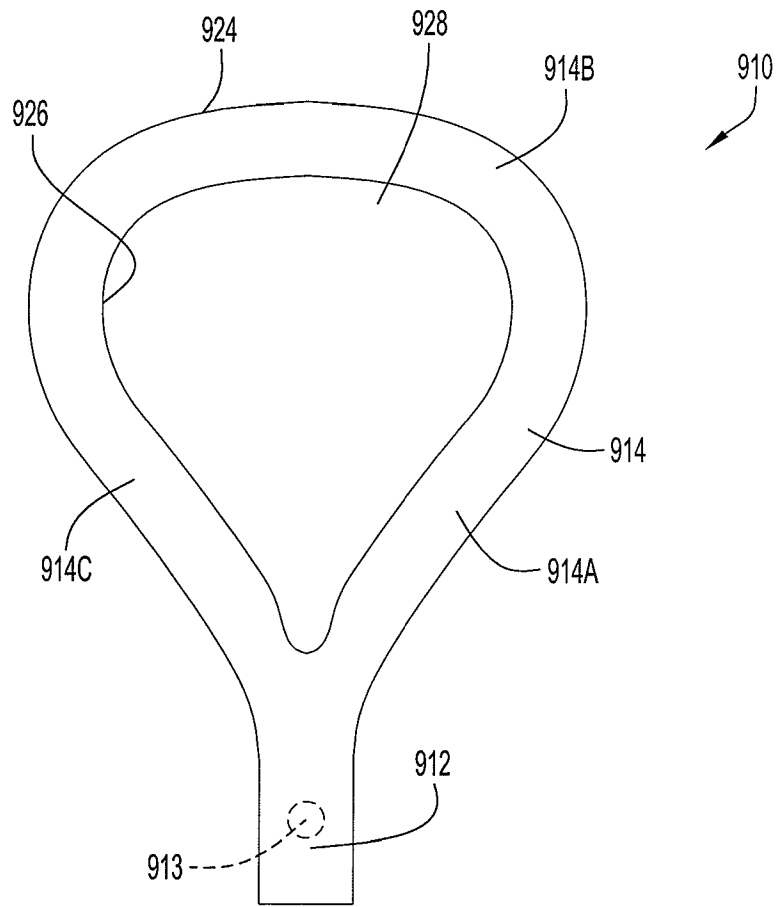
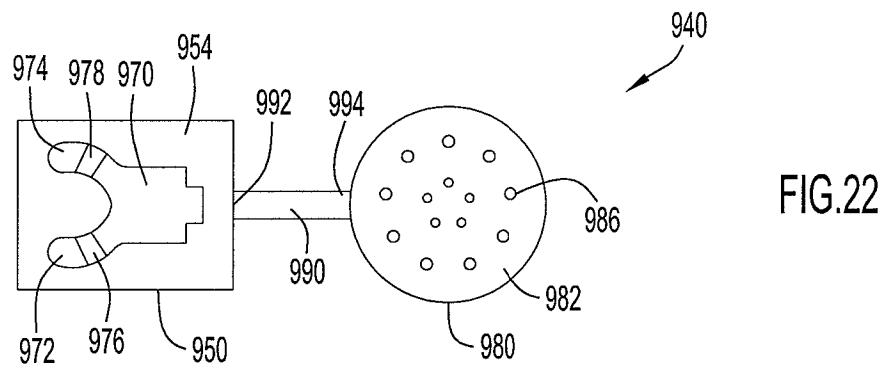
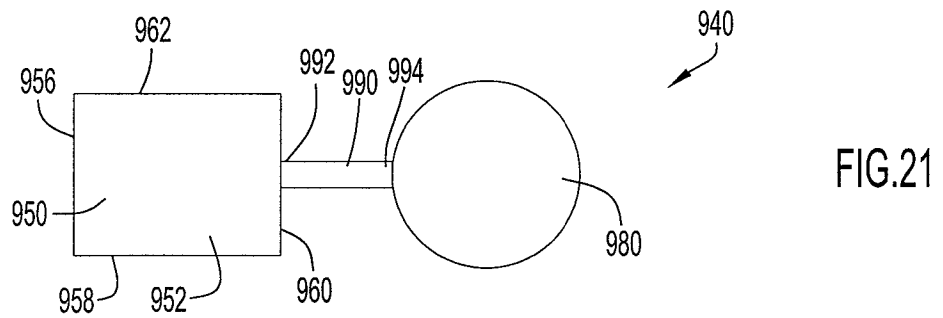
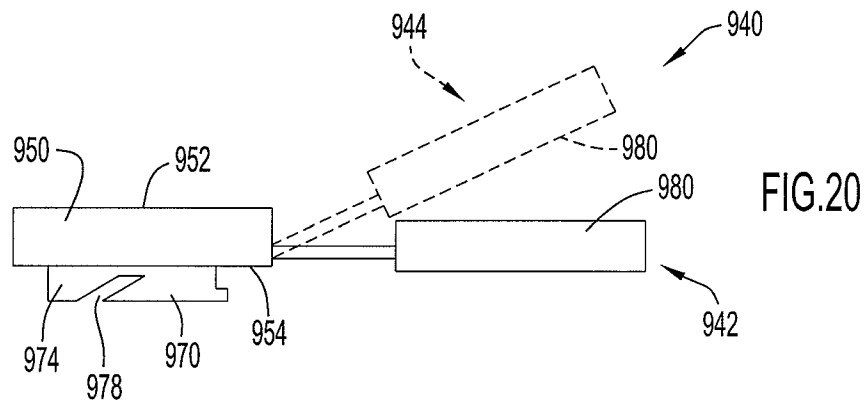


FIG.19



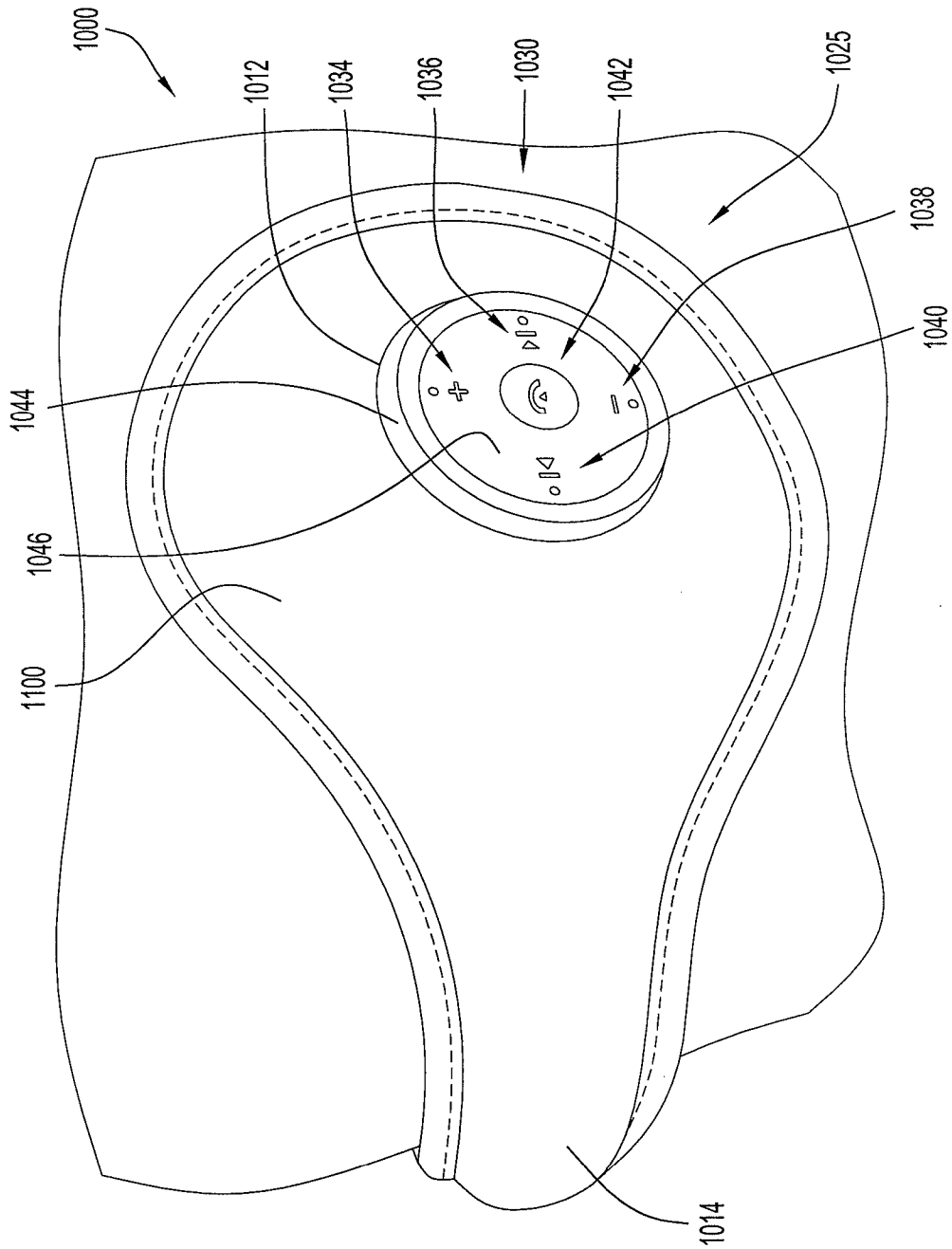


FIG. 23

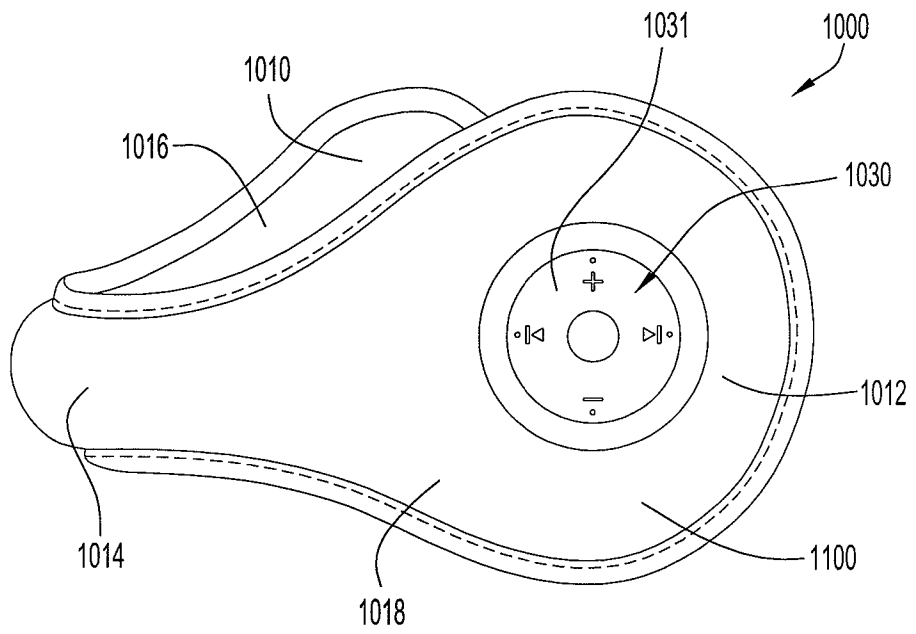


FIG.24

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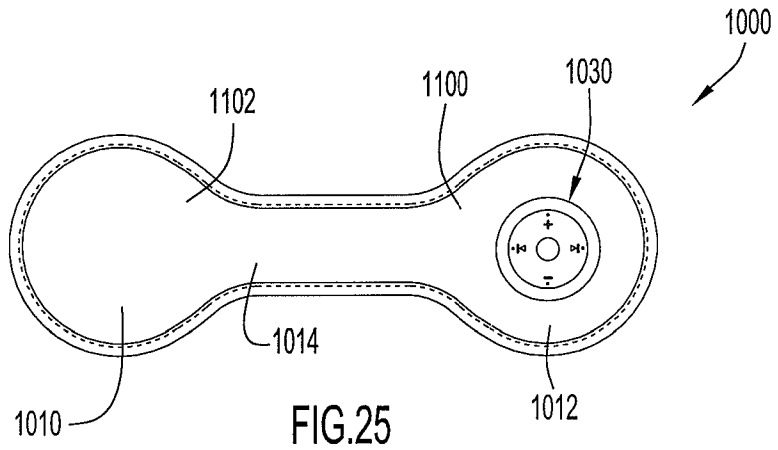


FIG. 25

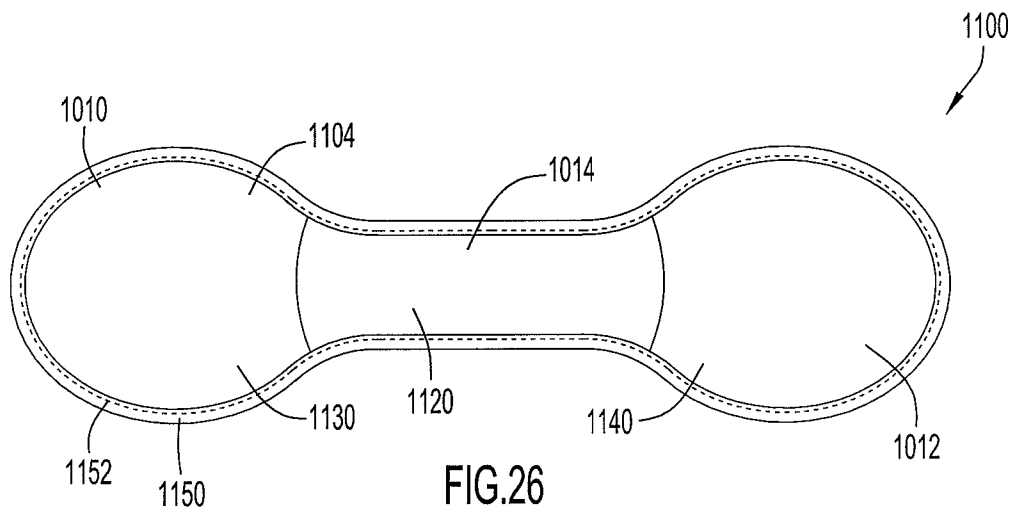


FIG. 26

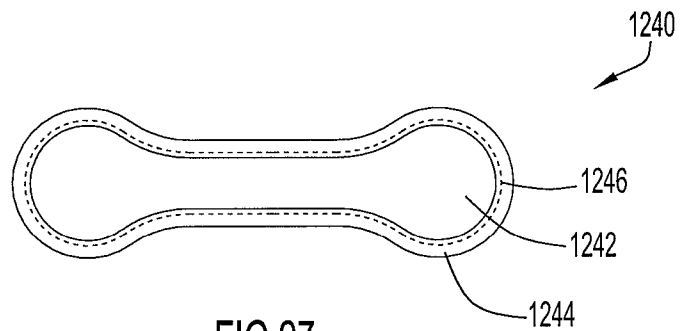
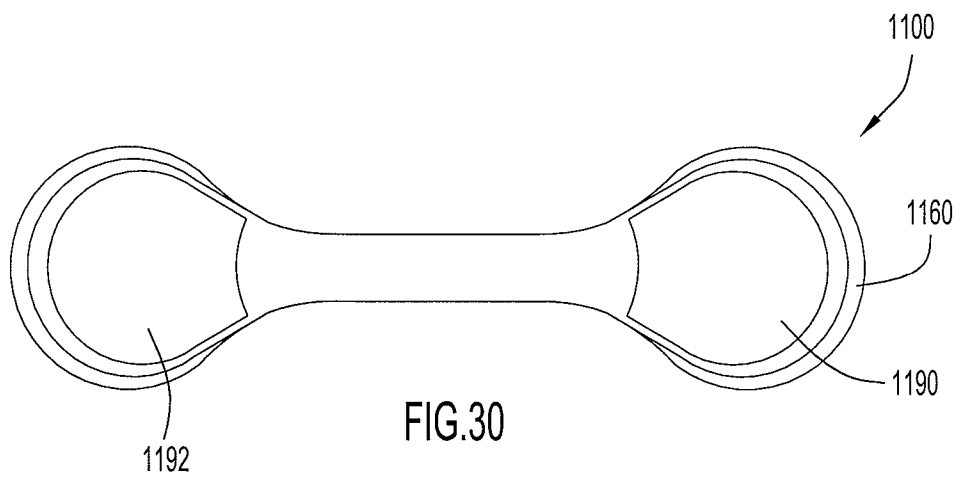
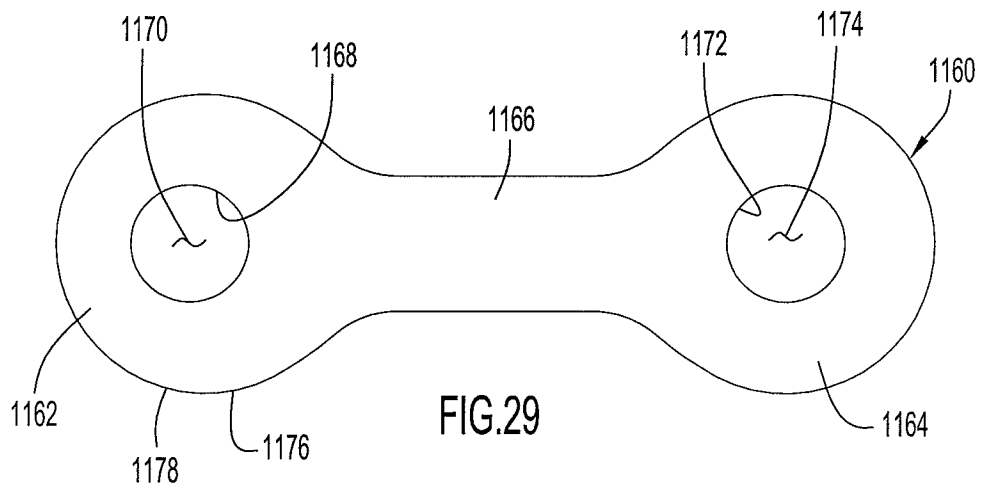
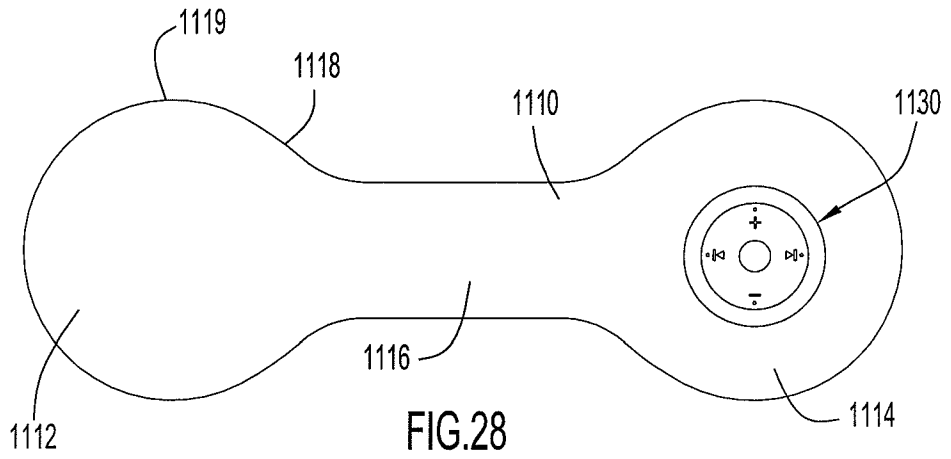


FIG. 27

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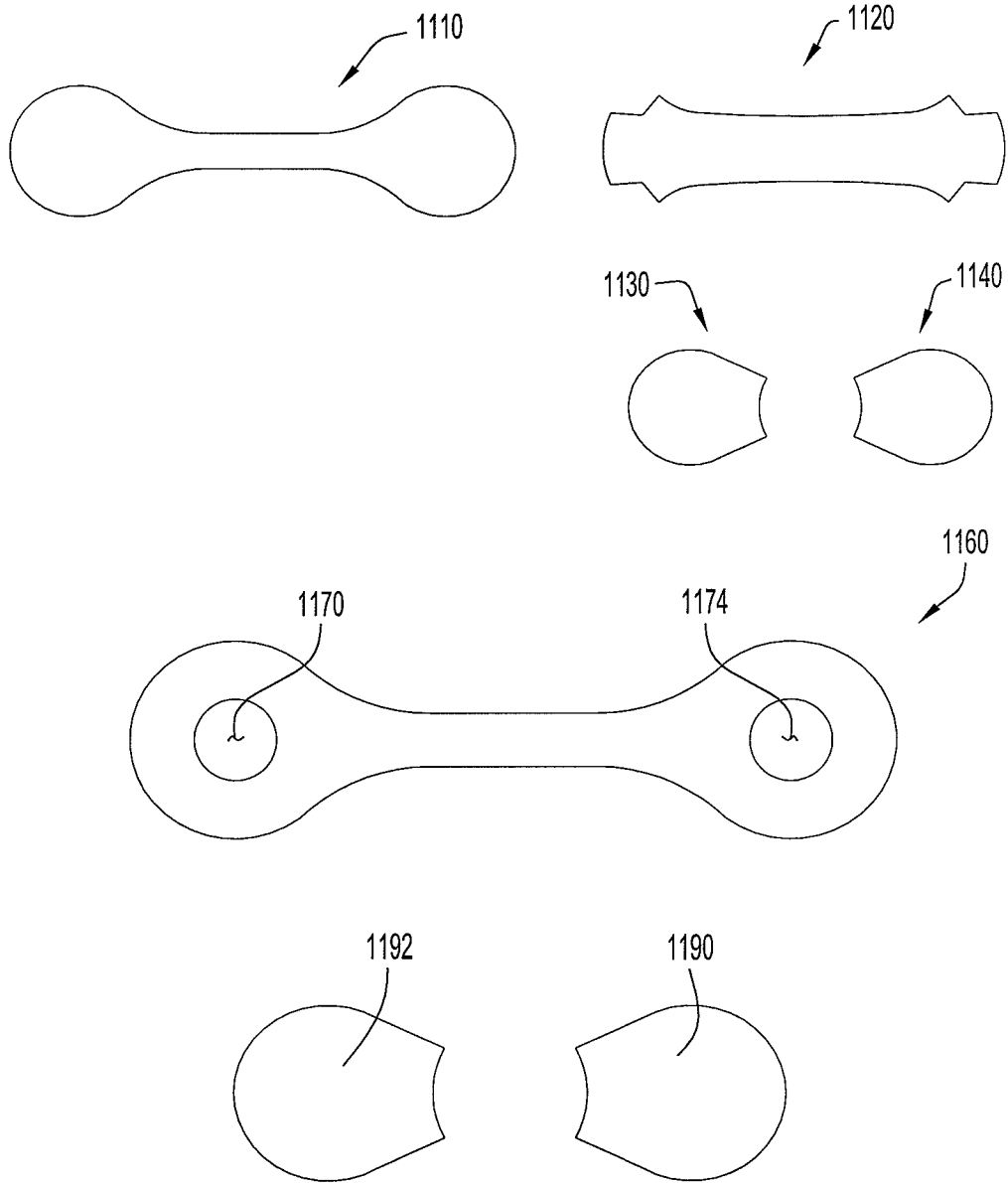


FIG.31

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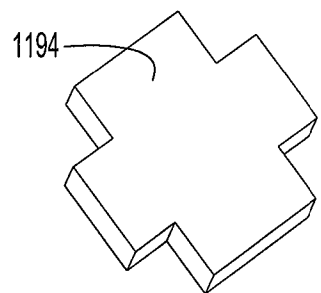
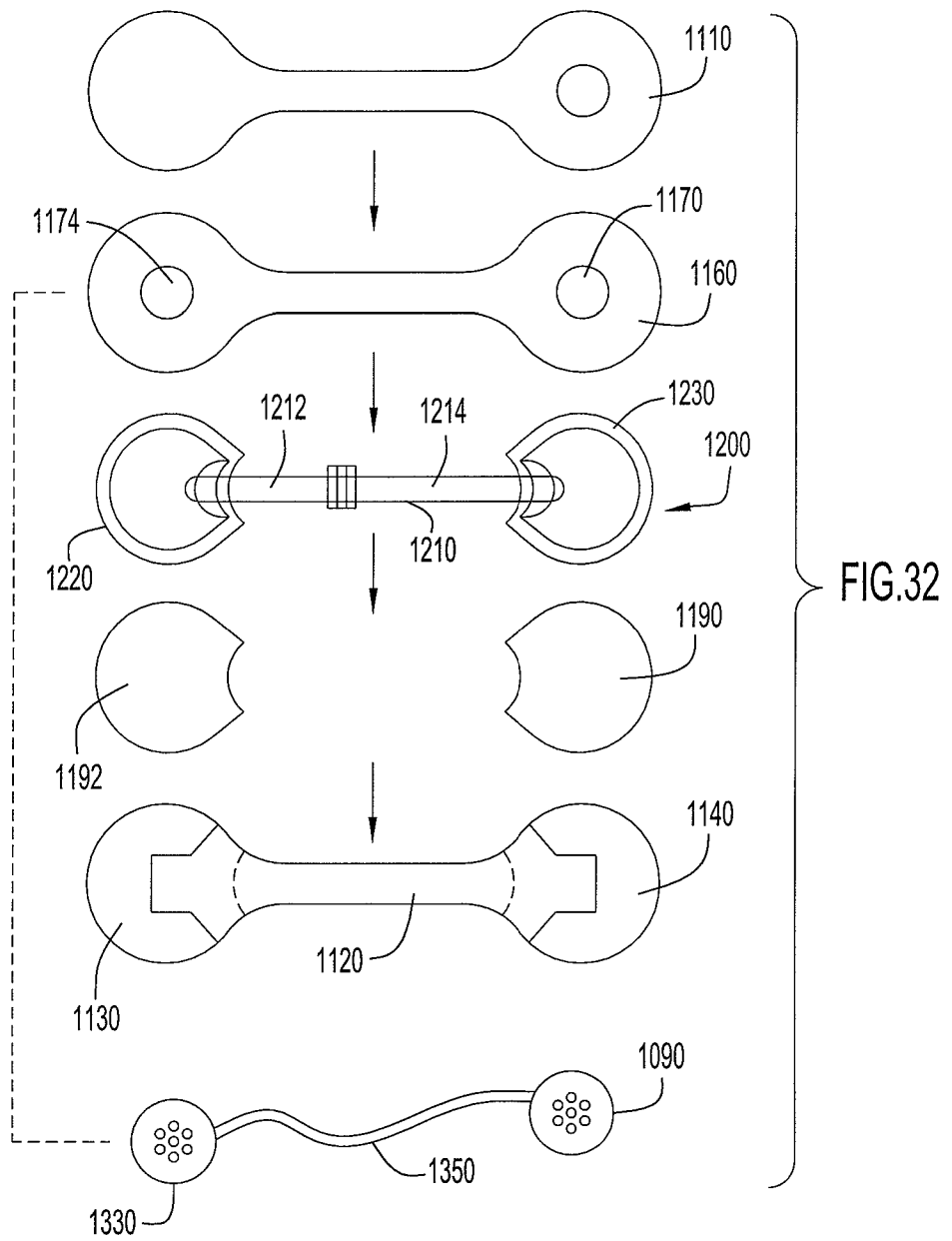


FIG. 33

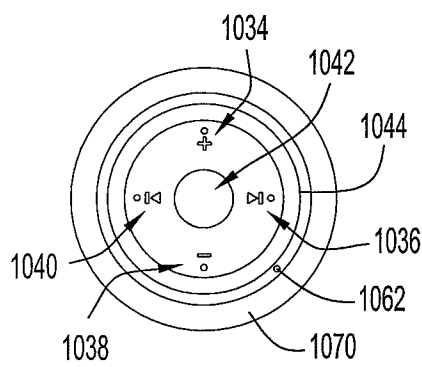
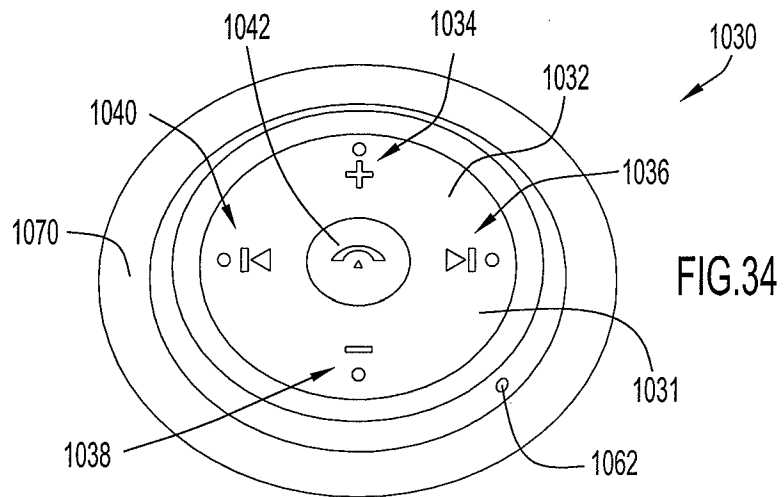


FIG.35

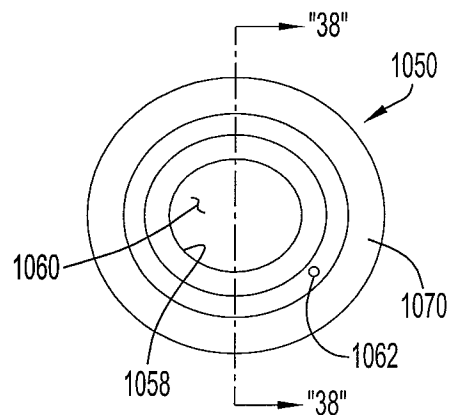


FIG.37

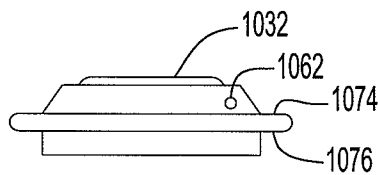


FIG.36

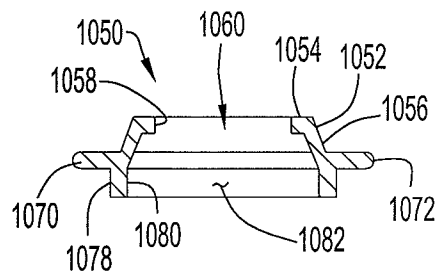


FIG.38

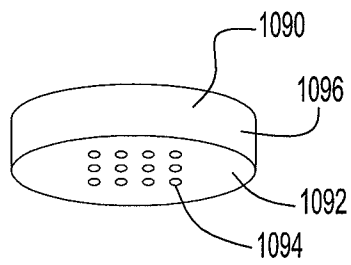


FIG.39

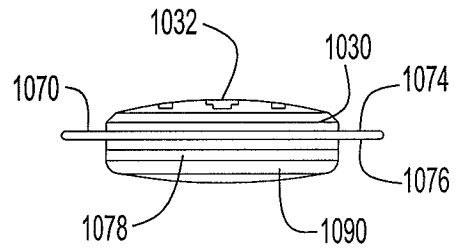


FIG.40

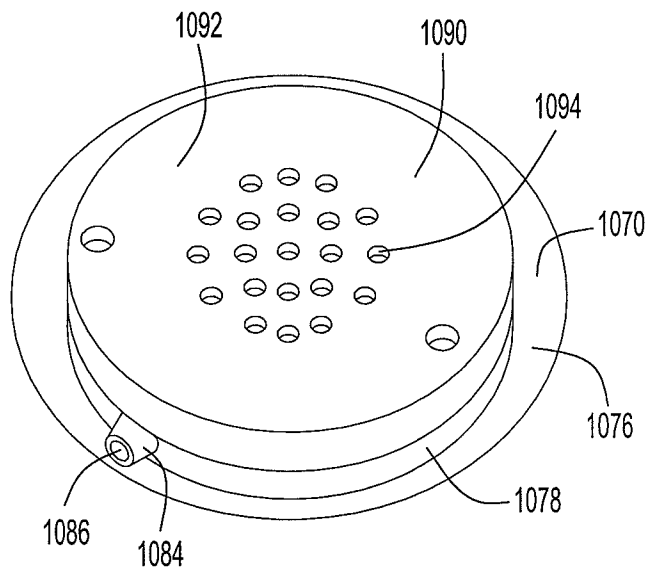


FIG.41

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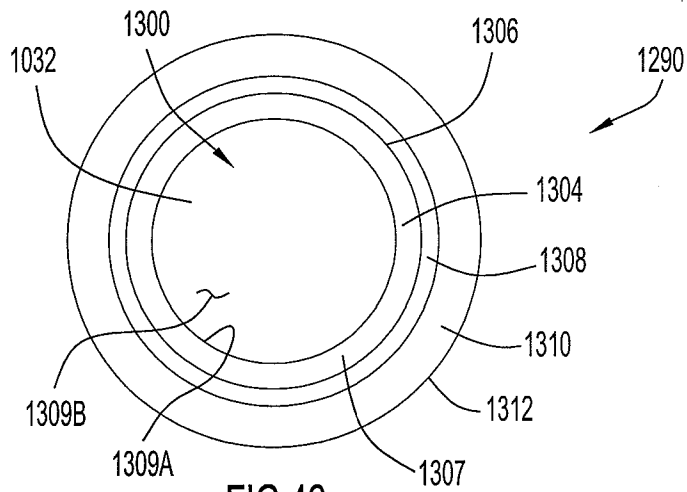


FIG. 42

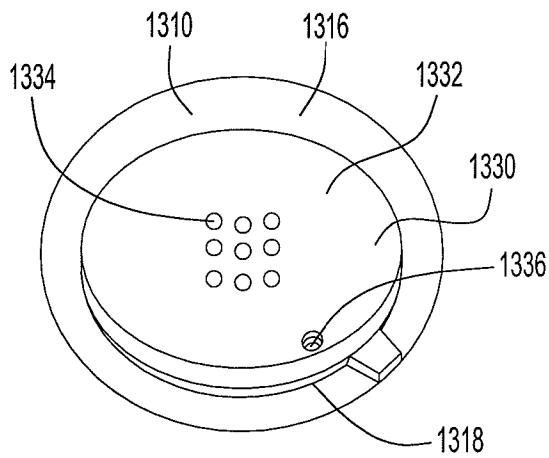


FIG. 43

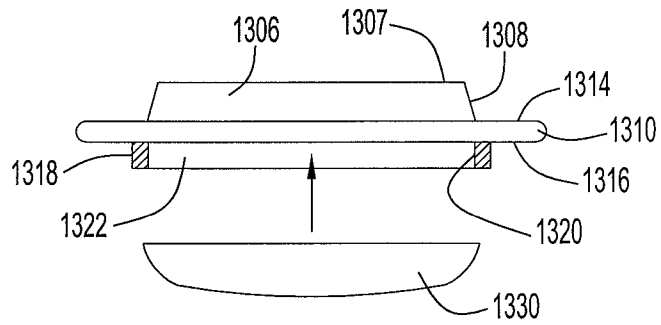


FIG. 44

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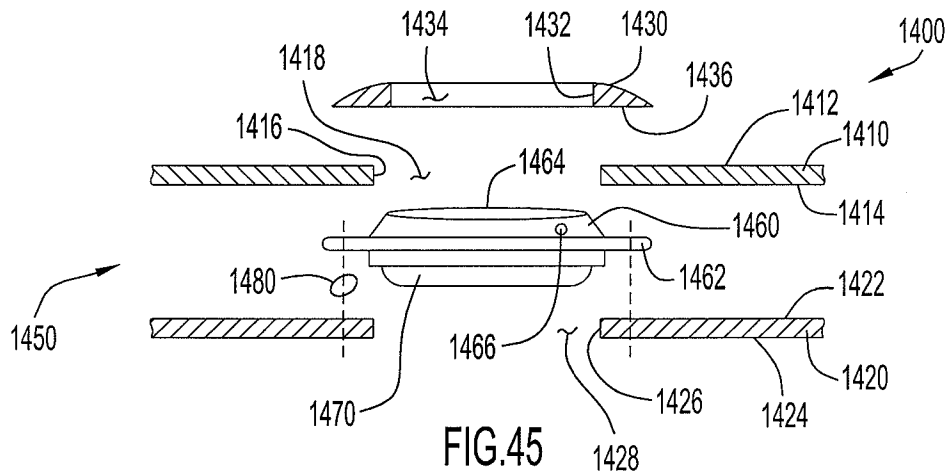


FIG.45

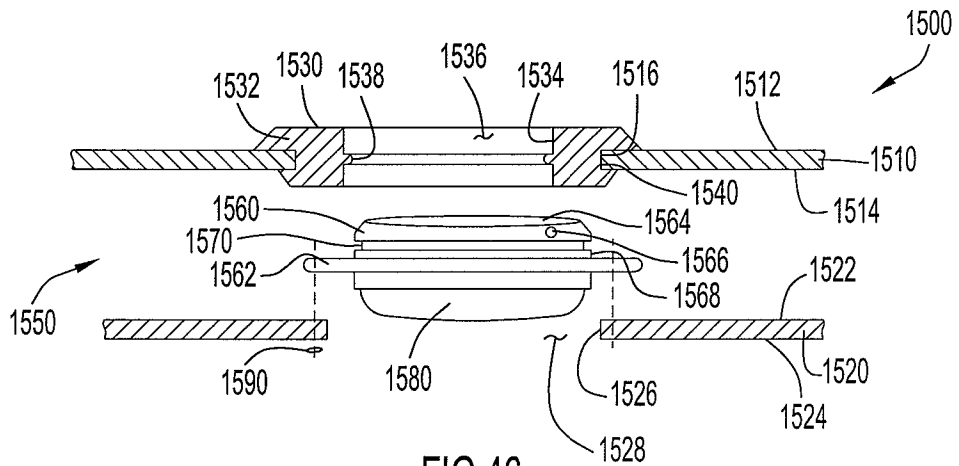


FIG.46

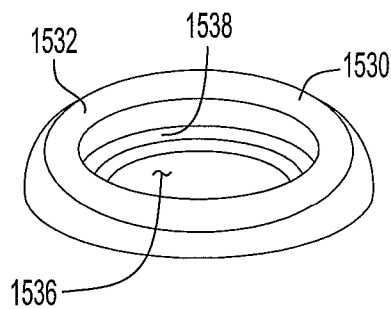


FIG.47

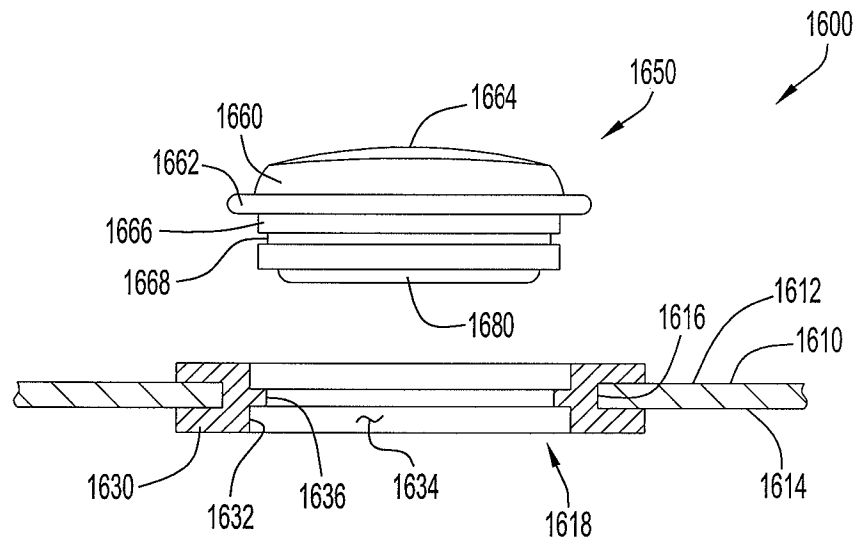


FIG.48

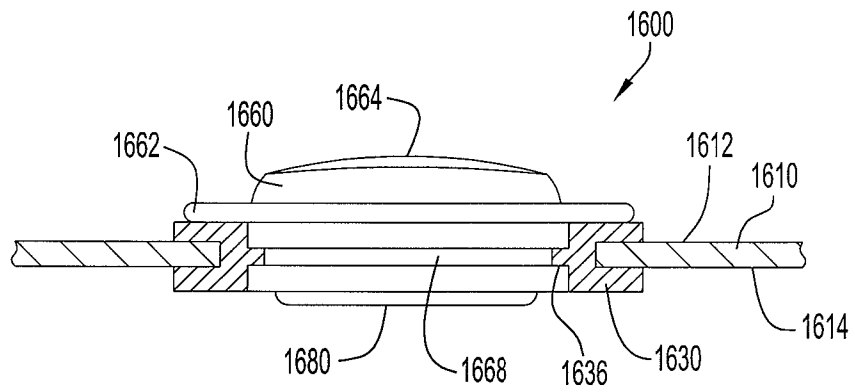


FIG.49

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/052957

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H04R 25/00 (2009.01)

USPC - 381/370

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(8) - H04R 25/00 (2009.01)

USPC - 381/370

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)

PatBase, Google Patents

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7,212,645 B2 (LE GETTE et al) 01 May 2007 (01.05.2007) entire document	1-20
Y	US 6,212,282 B1 (MERSHON) 03 April 2001 (03.04.2001) entire document	1-20
A	US 5,551,089 A (WHIDDEN) 03 September 1996 (03.09.1996) entire document	1-20
A	US 5,257,420 A (BYRNE, Jr.) 02 November 1993 (02.11.1993) entire document	1-20
A	US 5,881,390 A (YOUNG) 16 March 1999 (16.03.1999) entire document	1-20
A	US 2005/0034217 A1 (HEALY et al) 17 February 2005 (17.02.2005) entire document	1-20

 Further documents are listed in the continuation of Box C.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search

16 September 2009

Date of mailing of the international search report

28 SEP 2009

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