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(54) Title: ELECTRIC COMMUNICATION SYSTEMS

(57) Abstract

The present invention provides new electric communication systems for communicating information via low level electric shock. The electric communication system includes a source of low level electric current and a signal controller electrically connected to the source of low level electric current. A user contactable electrode is electrically connected to the signal controller and in contact with the user. The signal controller outputs a non–aversive electric current output signal indicative of information desired to be communicated to the user. The non–aversive electric current output signal is applied to the user through the electrode as a low level electric shock to communicate the information to the user.

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SPECIFICATION

TITLE:

"ELECTRIC COMMUNICATION SYSTEMS"

FIELD OF THE INVENTION

The present invention generally relates to electric communication systems for communicating through the sense of touch. More specifically, the present invention relates to new electric communication systems which use low level electric current to communicate information.

BACKGROUND OF THE INVENTION

Communication of information is absolutely essential in today's and tomorrow's modern society. Communication of information occurs in many different ways, and generally uses one of the five senses of sight, hearing, touch, smell and taste. The senses of sight, hearing and touch appear to be the most commonly utilized senses for communication of information. Accordingly, many

existing devices utilize the sense of sight, hearing or touch to communicate.

Some devices transmit information visually, such as televisions, computer screens, lights and signs, and other visual display devices. Devices which communicate through the sense of sight have limitations. The visually transmitted information may not reach the intended recipient. For example, the recipient's line of sight may be obstructed or completely blocked or the recipient may be looking in another direction. Visual information transmitting devices are highly directional and affected by the amount of light they emit and the prevailing light around the devices and the recipient. Visual transmission devices tend not to be selective as to who may receive the information. Unintended recipients may receive the visually transmitted information and thus, visual transmission systems may be undesirable for private or confidential communications.

Communication devices have also relied on sound to communicate information. For example, audio speakers, alarms, bells, buzzers and ringing wireless communicators such as, cellular telephones and pagers have been utilized to communicate via sound. Audio communication devices also have limitations. Audio broadcast signals may be received by unintended recipients which can be disruptive to the unintended recipient. The ringing of noisy cellular telephones in an otherwise quiet environment can be quite undesirable. Private or confidential communication by audio signals may also be compromised.

Existing devices have also utilized the sense of touch to communicate information. For example, pagers may include a vibrator which informs the wearer of the pager that the wearer is being paged. A hand held game controller for the Nintendo 64 video game also has a vibrator which can be felt by the player of the game. Mechanical vibrators have disadvantages in that the components may wear out. Vibrators may also require a relatively large amount of space which makes the vibrating device unnecessarily large due to the motor inside and the motor still makes noise. Electric circuits may also be quite sensitive to vibration and may be damaged by the vibrating device. Also, vibrating pagers must have a sufficiently strong vibration to pass through the wearer's clothing in order to communicate to the wearer.

Existing electric shock devices have also utilized the sense of touch by applying aversive electric shock. Existing electric shock devices apply relative high levels of electric shock to the recipient which is undesirable to the recipient. For example, electric shock devices include security devices and behavioral control devices. From the recipient's point of view the high level electric shock is undesirable, aversive and may even be harmful. These devices are typically used to control or prevent undesirable behavior. Similar high level electric shock devices have been used to train animals or contain animals within a defined area. Invisible electric fences for dogs are animal control devices. High level electric

shock devices apply a relatively high voltage and/or a relatively high amount of electric current to the recipient to cause pain and alter the behavior of the recipient.

Existing medical devices have applied low level electric shock to patients. One such medical device is shown in Figure 1. The medical device provides electrical stimulus and treatment to the patient. However, the medical device does not communicate information to the patient. The low level electric current used in the medical device is generally not painful to the patient; however, the patient does not receive information or communication from the medical treatment device.

Therefore, there would be advantages to having new electric communication systems for communicating information to recipients. There would be advantages to having new electric communication systems which communicate information to recipients using low level electric current applied to the recipient.

SUMMARY OF THE INVENTION

The present invention provides new electric communication systems which communicate information to recipients. The new electric communication systems apply a low level electric current signal to the recipient. The low level

electric current signal is indicative of information that is desired to be communicated to the recipient. The recipient receives the low level electric current signal as a friendly, non-aversive signal. For example, the signal may be felt by the recipient as a tingle on the recipient's skin.

The electric communication systems of the present invention utilize the sense of touch to communicate information. Because the sense of touch is rather personal and private, the electric communication systems can communicate information in many situations where other modes of communication may be less desirable. Information communicated according to the present invention using low level electric current is communicated directly to the recipient without being randomly broadcast to other unintended recipients. The electric communication systems are quiet and thus, not disruptive to the recipient or unintended recipients.

The electric communication systems of the present invention communicate information to recipients in a highly confidential manner. The information is communicated to the recipient by using the recipient's sense of touch and thus, unintended recipients cannot receive the communicated information. Also, only the recipient of the low level electrical current signal is aware of the communication. Others are unaware that the communication to the recipient is taking place.

One electric communication system according to the present invention

includes a source of low level electric current and a signal controller connect to the source of low level electric current. The signal controller has a non-aversive electric current output signal indicative of information desired to be communicated. A user contactable electrode is electrically connected to the signal controller by the non-aversive electric current output signal. The non-aversive electric current output signal is applied to the user or recipient in a friendly manner such that the user receives the information comfortably and without receiving an aversive electrical shock.

One specific example of an electric communication system according to the present invention is a wrist watch having electrical contacts on the backside of the watch which are in contact with the wearer's skin. The wrist watch applies a low level electric shock to the wearer when a particular event occurs, such as an alarm indicating a particular time of day.

The present invention also provides new methods of communication. The new methods of communication pertain to communicating information to recipients by utilizing low level electric current shock. One method of communicating according to the present invention includes the steps of converting a signal indicative of information to be communicated to a recipient into a low level electric current signal, supplying the low level electric current signal to an electrically conductive electrode in contact with the recipient, and applying a low

level electric shock of the electric current signal to the recipient from the electrode. The communication methods may include a step of producing the signal indicative of information to be communicated, for example an alarm on a wrist watch. The communication methods may also include a step of receiving the signal indicative of information to be communicated by transmission from a wireless information signal producer, for example a signal produced by a cellular telephone indicating that the telephone has an incoming call which is received by a device worn by the recipient and communicated to the recipient using low level electric shock.

The present invention provides new electric communication systems and methods to communicate information to recipients using low level electric shock. The new electric communication systems provide convenient and cost effective ways of communicating information. An advantage of the present invention is to provide new electric communication systems and methods of communication which overcome deficiencies of existing communication systems and methods.

Another advantage of the present invention is to provide electric communication systems which communicate information to a recipient using low level electric shock.

Another advantage of the present invention is to provide electric communication systems which utilize the sense of touch to communicate.

Another advantage of the present invention is to improve the privacy and security of communicating information.

Another advantage of the present invention is to provide new devices and methods for transmission of information.

Another advantage of the present invention is to reduce or eliminate disturbance to a non-intended recipient of communicated information.

Another advantage of the present invention is to reduce the amount of space, components, complexity and improve reliably of existing mechanical and electrical communication devices.

Another advantage of the present invention is to provide information transmitting devices which are relatively light weight.

Another advantage of the present invention is to provide electric communication systems which communicate information such that the recipient receives a friendly, non-aversive electric shock signal.

Another advantage of the present invention is to improve the effectiveness of communicating information to a recipient and enhance communication of information.

Other advantages of the present invention will become apparent upon reading this disclosure including the appended claims and with reference to the accompanying drawings. The above and other advantages may be desired, but are

not required by the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows an existing low frequency electric medical device.

Figure 2 shows a wrist watch electric communication system according to the principals of the present invention.

Figure 3 shows another wrist watch electric communication system according to the present invention.

Figure 4 shows an electrode pattern according to the principals of the present invention on the backside of a wrist watch.

Figure 5 shows another electrode pattern according to the present invention.

Figure 6 shows a clock electric communication system according to the present invention.

Figure 7 shows a schematic diagram of a one-way wireless electric communication system according to the present invention.

Figure 8 shows another schematic diagram of wireless communication according to the present invention, including a cellular phone and a pager.

Figure 9 shows alternate electrodes on the cellular phone and pager of Figure 8.

Figure 10 shows a schematic diagram of various devices communicating with a recipient using wireless communication according to the present invention.

Figure 11 shows a schematic diagram of additional devices communicating with a recipient using wireless communication according to the present invention.

Figure 12 shows a watch type phone and a watch type pager according to the principals of the present invention.

Figure 13 shows another portable phone and another pager according to the present invention.

Figure 14 shows a schematic diagram of television cameras and an actor utilizing an electric communication system according to the present invention.

Figure 15 shows a two-way electric communication system according to the present invention.

Figure 16 shows a hand held game having an electric communication system according to the present invention.

Figure 17 shows another hand held game having an electric communication system according to the present invention.

Figure 18 shows a top view of a hand held game controller having an electric communication system according to the present invention.

Figure 19 shows a bottom view of the game controller of Figure 18.

Figure 20 shows another hand held game controller having an electric communication system according to the present invention.

Figure 21 shows a game enhancer having an electric communication system according to the present invention.

Figure 22 shows a game machine having an electric communication system according to the present invention.

Figure 23 shows another game machine having an electric communication system according to the present invention.

Figure 24 shows another game machine having an electric communication system according to the present invention.

Figure 25 shows a home theater enhancer having an electric communication system according to the present invention.

Figures 26a, 26b, 26c show steering wheels having electric communication systems according to the present invention.

Figure 27 shows an automobile shift lever having an electric communication system according to the present invention.

Figure 28 shows another automobile shift lever having an electric communication system according to the present invention.

Figure 29 shows a motorcycle handle having an electric communication system according to the present invention.

Figure 30 shows a bicycle handle having an electric communication system according to the present invention.

Figure 31 shows a fishing rod for an electronic game having an electric communication system according to the present invention.

Figure 32 shows a mouse for a computer having an electric communication system according to the present invention.

Figure 33 shows a keyboard for a computer having an electric communication system according to the present invention.

Figure 34 shows a touch screen having an electric communication system according to the present invention.

Figure 35 shows a computer touch pad having an electric communication system according to the present invention.

Figure 36 shows a ring having an electric communication system according to the present invention.

Figure 37 shows a bracelet having an electric communication system according to the present invention.

Figure 38 shows an earring having an electric communication system according to the present invention.

Figure 39 shows a necklace having an electric communication system according to the present invention.

Figure 40 shows a writing instrument having an electric communication system according to the present invention.

Figure 41 shows a chair having an electric communication system according to the present invention.

Figure 42 shows a desk having an electric communication system according to the present invention.

Figure 43 shows a wall having an electric communication system according to the present invention.

Figure 44 shows electric communication systems positioned at various locations on a person.

Figure 45 shows another electric communication system according to the present invention used with an animal.

Figure 46 shows a front view of an electrode pad according to the present invention.

Figure 47 shows a back view of the electrode pad of Figure 46.

Figure 48 shows an expanded view of a portion of the back of the electrode pad of Figure 47.

Figure 49 shows a character pattern communicated by the electrode pad of Figures 46-48.

Figure 50 shows a schematic diagram of a morse code type signal

communicated using an electric communication system of the present invention.

Figure 51 shows a pair of glasses having an electric communication system according to the present invention.

Figure 52 shows a watch type electric communication system having removable electrode pads.

Figure 53 shows the watch type system of Figure 52 with the electrode pads removed.

Figure 54 shows an adapter side of the electrode pads of Figure 53.

Figure 55 shows a side view of the adapter pads of Figure 54.

Figure 56 shows another watch type electric communication system according to the present invention.

Figure 57 shows another watch type electric communication system having a single adapter receptacle.

Figure 58 shows an electrode pad usable with the watch system of Figure 57.

Figure 59 shows an adapter side of the electrode pad of Figure 58.

Figure 60 shows a side view of the electrode pad of Figure 58.

Figures 61-63 show an adapter pad which can be painted with electrically conductive paint or have electrically conductive clay type material mounted on the pad.

Figures 64-66 show a navigator having an electric communication system according to the present system.

Figure 67 shows another watch type electric communication system according to the present invention.

Figure 68 shows another watch type electric communication system according to the present invention having an air flow feature.

Figure 69 shows the backside of the watch type electric communication system of Figure 68.

Figure 70 shows a cross-sectional view of the watch type electric communication system of Figure 69.

DETAILED DESCRIPTION OF PRESENTLY PREFERRED EMBODIMENTS

Although the present invention can be made in many different forms, the presently preferred embodiments are described in this disclosure and described in the attached drawings. This disclosure exemplifies the principals of the present invention and does not limit the broad aspects of the invention only to the illustrated embodiments.

A new electric communication system according to the present invention as shown in Figure 2 as embodied in a wrist watch 10. The wrist watch 10 has a

band 12 for wearing the wrist watch and a front display face 14. The wrist watch 10 has a backside 16 which is shown partially cut away to reveal a battery 20 and a electronic control circuit 22. An electrode 24 is provided on the backside 16 on the wrist watch 10. The electrode 24 has a pair of electrical contacts 26 spaced apart and surrounded by an electrically resistive material 28.

Information is communicated from the wrist watch 10 to the wearer using the electronic communication system as follows. An event may occur in the wrist watch 10 which is to be communicated to the wearer. For example, the wearer may set an alarm by using watch controls 27 to inform the wearer when a particular time of day has occurred. The wrist watch 10 is controlled by the electronic control circuit 22 and powered by the battery 20. The electronic control circuit 22 also controls application of low level electric current from the battery 20 to the electrical contacts 26 of the electrode 24. When the alarm is set off, the electronic control circuit 22 provides a low level electric shock to the wearer through the electrical contacts 26 which are in contact with the wearer's skin. In this manner, the alarm indicating a particular time of day has been communicated to the wearer via the electric communication system of the present invention.

The electrically resistive material 28 separates the electrical contacts 26 of the electrode 24. This ensure that the low level electric shock passes through

the wearer of the wrist watch 10 rather than through the material of the watch. Rubber is one example of a suitable electrically resistive material 28.

It is anticipated that the electric communication systems of the present invention will use alternating current to communicate. However, the present invention also contemplates using direct current. It is believed that a low level alternating current shock will provide a more pronounced feeling to the recipient as compared to a low level direct current shock. One of the electrical contacts 26 of the electrode 24 may be a hot lead and the other electrical contact a neutral lead if the system is applying an alternating current electric shock. If alternating current is used and the power source provides direct current (e.g., a battery), then a direct current to alternating current converter would be included in the system. Of course, if direct current is being used one of the electrical contacts 26 will be a positive (+) contact and the other a negative (-) contact.

The low level electric shock of the electric communication system is defined by electrical perimeters such that the recipient of the shock is not offended by the shock. For example, the voltage, current and wave form of the electric shock are controlled by the electronic control circuit 22 and the battery 20 to be non-aversive to the recipient. The recipient may feel a pleasant tingle caused by the low level electric shock which indicates the alarm has tripped. Low level electric shock provided by the electric communication system should also be

sufficiently low such that the electric shock is medically acceptable. One low level electric shock according to the present invention may have a current up to about 20 mA.

A wrist watch 30 having a modified electric communication system according to the present invention is shown in Figure 3. The wrist watch 30 has a pair of electrode pads 32 which extend from the backside of the wrist watch 30 along the band 12. The electrode pads 32 on the wrist watch 30 provide a greater surface area for communicating to the wearer than the electrical contacts 26 of the electrode 24 in the wrist watch 10 of Figure 2.

Figure 4 shows an alternate electrode pattern on the back of a wrist watch type device 34. The wrist watch type device has a plurality of electric contacts 26 spaced apart by electrically resistive material 28. A selected group of electrical contacts 26 may be activated (low level electrical current applied to that particular group) to indicate particular information communicated to the recipient. For example, a group of electrical contacts 26 designated at 36 may be activated by the electronic control circuit within the wrist watch 34 to indicate a north direction. Other groups of electrical contacts 26 can be activated to indicate other directions or other types of information.

Figure 5 shows another wrist watch type device 38 having another pattern of electrical contacts 26 spaced apart by the electrically resistive material

28. The electrical contacts 26 and the wrist watch device 38 of Figure 5 form a matrix and can be activated to form a particular pattern. For example, Figure 5 shows an activated pattern 40 of electrical contacts 26 forming the number 5. The number appears to be backwards in Figure 5, because Figure 5 shows a backside view of the wrist watch 38. In addition to numbers, other patterns such as letters and various shapes can be activated by the electronic control circuit to communicate information to the wearer of the wrist watch 38.

Figure 6 shows an alarm clock 42 having a pair of electrical pads 44. The typical audio alarm of the alarm clock 42 can be turned off and the electric communication system can be utilized instead to indicate the alarm. The electrical pads 44 are placed on the wearer and when the alarm is set off, a low level electric current signal is communicated to the wearer through the electrical pads 44.

Figure 7 shows a one-way wireless electric communication system 46 of the present invention. A transmitter 48 can be activated by depressing a button 50 to transmit a wireless signal 52. The wireless signal 52 is received by a receiver 54 which applies a low level electric shock to a wearer of the receiver 54 through the electrical contacts 26. The transmitter 48 may be activated by a person who wishes to communicate with the wearer of the receiver 54. The electric communication system 46 of Figure 7 can be used to communicate a wide variety

of information. For example, the transmitter 48 can be activated to communicate to a wearer of the receiver 54 that a particular event has occurred or for the wearer of the receiver 54 to take a particular action. Although the electric communication system 46 of Figure 7 shows only a pair of electrical contacts 26, numerous types of electrical contacts could be used to communicate various types of information or more detailed information, such as the patterns or matrix of electrical contacts shown in Figures 4 and 5. Also, a single transmitter 48 could communicate with multiple receivers 54 worn by various people.

There can be numerous useful applications of a wireless electric communication system 46. For example, the receiver 54 can be worn by a person who is outside of the house and a low level electric shock signal can be applied to the wearer to let the wearer know that an event has occurred inside the house. Such an event may include for example that the telephone is ringing because there is an incoming call and the person outside of the house cannot hear the ringing telephone.

Figure 8 shows two embodiments of the electric communication system 46 of Figure 7. A cellular phone 56 may transmit a wireless signal 52 indicating that the cellular phone 56 has an incoming call. The wireless signal 52 is received by the receiver 54 and a low level electric shock is applied to the wearer of the receiver 54. Similarly, a pager 58 may transmit a wireless signal 52 to the

receiver 54 indicating that a page has occurred. The receiver 54 then applies a low level electric shock to the wearer informing the wearer that the pager has received a page.

Figure 9 shows alternate electrodes on the cellular phone 56 and the pager 58 of Figure 8. The cellular phone may have additional electrode pads 60 on the backside of the cellular phone 56. The cellular phone 56 may apply a low level electric shock to the person holding the phone through the electrode pads 60. The low level electric shock may be a signal to the holder of the phone 56 indicating that an incoming call has occurred, there is a call waiting, voice mail has received a message or some other information to be communicated to the user of the cellular phone. Likewise, the pager 58 may have electrical contacts 26 on a backside of the pager 58. The pager 58 may administer a low level electric shock to the wearer of the pager from the electrical contacts to indicate that a page has occurred.

Various other devices could be equipped with electric communication systems according to the present invention to communicate various information to a recipient. For example, Figure 10 shows several appliances which may communicate information to a recipient using a wireless signal 52. A fax machine 62 may communicate to a recipient 64 wearing a receiver 54 that an incoming fax has occurred or an outgoing fax has been sent. An air conditioner 66 may

transmit information to the recipient 64 indicating that the air conditioner 66 is turned on or off or indicating a particular temperature, for example. A refrigerator 68 or a door 70 may transmit information to the recipient 64 indicating opening and closing of the devices. A light 72, an alarm 74, and a television 76 may communicate with the recipient 64 indicating the status of those devices. Visually impaired people may particularly find the electric communication systems useful to indicate the status of various devices.

Figure 11 shows computer type equipment incorporating an electric communication system of the present invention. A portable computer 78 may send a wireless signal 52 to a receiver 54 having electrodes 80. Similarly, a personal data assistant 82, a notebook computer 84 or a personal computer 85 may transmit information to a wearer of the receiver 54 through the wireless signal 52. The personal computer 85 may even be connected to a computer network 87 so that other computer users on the network can communicate with the wearer of the receiver 54. Examples of information communicated to the wearer of the receiver 54 may include notification of incoming and outgoing electronic mail and calendar or scheduling information.

Figure 12 shows a watch type phone 86 and a watch type pager 88 having electric communication systems according to the present invention. A backside 90 of the watch type phone 86 and the watch type pager 88 has an

electrode 24 to communicate information to the recipient.. The electrode 24 may have a pair of electrical contacts 26 which apply a low level electric shock to the wearer of the phone or pager 86, 88. The low level electric shock administered to the wearer through the electrical contacts 26 may be indicative of an incoming phone call or page, for example.

Figure 13 shows another watch type phone 92 and another watch type pager 94 having electric communication systems of the present invention. The watch type phone 92 and watch type pager 94 have electrically conductive pads 96 which apply the low level electric shock signal to the wearer of the devices. The electrically conductive pads 96 provide a larger surface area by extending along a wrist band 98 to contact the wearer of the devices.

Figure 14 shows a schematic diagram of television cameras 100a , 100b, 100c and an actor 102 utilizing an electric communication system of the present invention. It is common to utilize multiple television cameras when broadcasting a television program. The people appearing in the television program need to know which camera is currently being used at any given moment to televise the program. The electric communication system can be used to communicate to the actor 102 to inform the actor which television camera is currently being used. The television camera which is on, for example camera 100b, can transmit a wireless signal 52 to a receiver 54 worn by the actor 102. The signal receiver 154

applies a low level electric shock to the actor 102 indicating to the actor that a television camera 100b is currently shooting the scene. The actor 102 will become aware of which television camera is currently active quite easily because the active camera will transmit the appropriate signal to the actor using the electric communication system.

The electric communication system of the present invention also can be used in a two-way communication application. Figure 15 shows an example of a two-way electric communication system of the present invention. A first transmitter and receiver device 104 is worn by a first person and a second transmitter and receiver device 106 is worn by a second person. A button 108 can be pressed on the first transmitter and receiver device 104 to send a wireless signal 52 to the second transmitter and receiver device 106. The second transmitter and receiver device 106 receives the wireless signal 52 from the first transmitter and receiver device 104 and applies a low level electric shock to the wearer through the electrode 24. Similarly, a button 108 on the second transmitter and receiver device 106 can be pressed to transmit a wireless signal 52 to the first transmitter and receiver device 104 and apply a low level electric shock through the electrode 24 of the first transmitter and receiver device 104. Wearers of the first and second transmitter and receiver devices 104, 106 can communicate to each other by using the electric communication system, and thus,

the electric communication system of Figure 15 is a two-way communication system. Of course, the first and second transmitter and receiver devices 104, 106 can utilize activation mechanisms other than the buttons 108, for example a key pad entry mechanism. The electrodes 24 could be replaced with electrodes capable of applying more complex patterns and electrical signals to the wearers of the devices.

Figure 16 shows a Nintendo Game Boy electronic game device 110 having a new electric communication system. The electronic game device 110 is a hand held, battery operated game and is operated by controls 112. Electrode pads 114 are provided to communicate information from the electronic game device 110 to the person holding the game device. Another hand held, battery operated electronic device 16 is shown in Figure 17. The electronic device 116 is commercially available as a Tamagochi device. Electrode pads 118 are provided on the electronic device 116 to communicate information to the player of the device.

Figures 18 and 19 show a game controller 120 for a Nintendo 64 electronic game having an electric communication system. The game controller 120 is connected to the game control unit (not shown) by a cable 122. Electrode pads 124 are provided at various locations on the game controller 120 to communicate with the player of the game by using low level electric shock. Low

level electric power may be provided to the electrode pads 124 from the game unit (not shown) through the cable 122. A variety of information can be communicated from the electronic game to the player of the game through the electrode pads 124. For example, when a character in the game is injured by an opponent, a low level electric shock may be applied to the player holding the game controller 120 and contacting the electrode pads 124. The electric communication system can enhance the game playing experience beyond that provided by existing electronic games.

The game controller 120 has a connection 126 which can be connected to a vibrating device. The new electric communication system has advantages over vibrating devices as discussed above. Game enhancing software can be provided to allow player control of which electrode pad 124 is activated and under what conditions the electrode pads 124 are activated. The game controller 120 may be held in a variety of different positions on a players hand. Accordingly, a player may wish to program which electrode pad 124 is activated for a particular event and under which events the electrode pads 124 are activated.

The electric communication system of the present invention can be used as a game enhancer for a variety of electronic games. Referring to Figure 20, a glove type controller 128 is shown having a new electric communication system. Various electrode pads 130 can be provided at various locations on the glove type

controller 128. An existing glove type controller without the new electric communication system is a glove controller for the Sony Play Station game unit. U.S. Patent Number 5,488,362 also shows a glove type game controller without an electric communication system of the present invention. Similar to the game controller 120 of Figures 18 and 19, the glove type controller 128 can communicate a variety of information from the electronic game to the player of the game.

Figure 21 shows a game enhancer electric communication system 132 having a plurality of electrode pads 134 which can be placed at various locations on a player's body. A game unit 135 provides low level electric current and control of the low level electric current to the electrode pads 134 for communicating information to the player of the game. A game controller 136 is provided for the player to communicate back to the game unit 135. The electrode pads 134 are shown as connected to the hand held game controller 136 by wires 138. However, the game enhancer electric communication system 132 could be a wireless system by removing the wires 138 and communicating from the game unit 135 to the electrode pads 134 using a wireless signal.

Arcade type game machines may also include the electric communication system of the present invention. Examples of arcade games having the electric communication system are shown in Figures 22-24. Electrode

pads 140 may be provided on hand operated game controllers 142 so that the game machines can apply low level electric current to the player of the game. Referring to Figure 24, electrode pads 144 may be applied to a game player and connected to the game unit by wires 146. Alternately, the wires 146 could be removed for a wireless type game enhancement system.

Electric communication systems of the present invention can be used to enhance audio-visual systems, for examples home theater systems. Referring to Figure 25, a home theater enhancer having an electric communication system 148 of the present invention is shown. The home theater system may include a large screen television and a plurality of speakers 152 surrounding a listening and viewing location 154. The television 150 may transmit a wireless signal 52 to listeners and viewers 156 to communicate information from the program to the listeners and viewers 156. A plurality of signal receivers 158 may be worn by the listeners and viewers 156 at various locations on their body. The signal receivers 158 have electrode pads 160 which contact the listeners and viewers 156 and apply a low level electric shock to the listeners and viewers 156. In this manner, information from the program played on the home theater system can be communicated to the listeners and viewers 156 through the electric communication system 148 by applying low level electric shock.

Figures 26-30 show examples of transportation devices including the

new electric communication systems to communicate with operators of vehicles. An automobile steering wheel 162 is shown in Figure 26a having electrode pads 164. The electrode pads 164 are connected to electronic control circuits and the automobile battery of the automobile (not shown). The automobile can communicate various information to the operator. Such information could include for example activation of left or right turn signals, traveling speed, proximity of the automobile to other objects, amount of fuel or oil available, tire air pressure, tachometer readings, incoming calls to a car telephone or other information. Various types of electrodes can be used on the steering wheel, for example, Figure 26b shows a steering wheel 162 having longer electrodes 163 and Figure 26c shows a steering wheel 162 having a plurality of spaced apart electrodes 165. Figure 27 shows an electrode pad 166 on a gear shift lever 168 for an automatic type transmission. The electric communication system of the present invention can be used to communicate to the vehicle operator which gear the vehicle is in by applying a low level electric shock through the electrode pad 166 to the operator when the operator's hand is on the gear shift lever 168. Similarly, Figure 28 shows an electrode pad 170 on a gear shift lever 172 for a manual type transmission.

Motorcycles and bicycles may also include the new electric communication systems. A motorcycle 174 is shown in Figure 29 having a

handle bar 176. Electrode pads 178 are provided on the handle bar 176 at a location where the motorcycle operator normally grips the handle bar 176. The motorcycle 174 can communicate information to the operator by administering low level electric shock to the operator through the electrode pads 178. Similarly, Figure 30 shows a bicycle 180 having a handle bar 182 which includes electrode pads 184. The bicycle 180 may have a generator or a battery connected to a control circuit or to a switch which provides low level electric current to the electrode pads 184 to communicate with the bicycle rider.

Figure 31 shows a fishing rod 186 used for playing an electronic fishing game having a video screen 187. Electrode pads 188 for applying a low level electric shock to the player (fisherman) of the game are provided on the fishing rod 186. The electric communication system on the fishing rod 186 may be used to communicate game information to the player (fisherman).

The electric communication system of the present invention may also be incorporated into computer hardware. For example, a computer mouse 190 and a keyboard 192 are shown in Figures 32 and 33, respectively. Electrode pads 194 can be provided at various locations on the mouse 190 or keyboard 192, including the keys on the keyboard. A touch screen computer input device 196 having electrode pads 198 is shown in Figure 34. The electrode pads 198 may be transparent so that they can be combined with the touch sensitive input screen of

the input device 196. A touch pad pointing device 200 commonly used on portable computers is shown in Figure 35. Electrode pads 202 may be provided on the touch pad 200 for communication to the operator of the touch pad 200. The electric communication systems shown in Figure 32-35 allow the computers to communicate with their operators using low level electric current.

The electric communication systems of the present invention utilizes the contact of electrodes with the person receiving the information. Accordingly, many types of devices which are in contact with the person can be adapted to use the electric communication system. For example, a ring 204 having electrode pads 206 is shown in Figure 36, a bracelet 208 having electrode pads 210 is shown in Figure 37, an earring 212 having electrode pads 214 is shown in Figure 38, a necklace 216 having electrode pads 218 is shown in Figure 39, and a pair of glass 219 having electrode pads 221 is shown in Figure 51. A writing instrument 220 having electrode pads 222 is shown in Figure 40. Furniture may also include the electric communication system, such as a chair 224 having electrode pads 226 shown in Figure 41 and a desk 228 having electrode pads 230 shown in Figure 42. Electrode pads 232 may even be placed on a wall 234 as shown in Figure 43. The electric communication systems shown in these figures would also include a power source and a controller (not shown) to supply low level electric current signals to the electrodes. The control circuit may even simply provide a direct

connection between the low level electric current source and the electrodes such that the low level electric current is continuously supplied to the electrodes. This arrangement may be useful, for example, for a user to identify a particular location on a device by feeling the low level electric shock when touching the location having the electrodes.

Figure 44 shows additional locations on a person where electrode pads 236 may be located. A receiver 238, including a power source, is connected to the electrode pads 236 to apply a low level shock to the wearer of the electric communication system. The electrode pads 236 may have an adhesive suitable for contact with skin to maintain the electrode pads 236 in their proper location, such as on the wearer's shoulder or back. A belt 240 can be used to wear the electric communication system around the waist, and a band 242 can be used to wear the electric communication system around a leg.

Figure 45 shows the electric communication adapted for use with animals. A dog collar 244 may have electrode pads 246 to administer low level electric shock to the dog. The electric communication system shown in Figure 45 applies a low level electric shock rather than an aversive shock used in animal training devices. The electric communication system could be useful for a visually impaired person to communicate with a seeing eye dog, for example.

Figures 46-49 show one electrode pad 248 in greater detail. Figure 46

shows a front side 250 of the electrode pad 248 which faces away from the wearer. The electrode pad 248 is connected to a controller and power source 252 by a cable 254. The controller 252 sends a signal 256 through the cable 254 to the electrode pad 248. Alternately, a receiver may be connected to the electrode pad 248 which receives a wireless signal from the controller 252.

A backside 258 of the electrode pad 248 is shown in Figure 47. The backside 258 has a matrix of individual electrodes 260 which can be selectively activated to produce output signals applied to the wearer as low level electric shock. Referring to Figure 48, an enlarged view of the backside 258 of the electrode pad 248 as shown. The individual electrodes 260 may be separated by material 262 which resists or prevents electric current flow, such as rubber. The individual electrodes 260 may be activated as either an electrically positive (+) or electrically negative (-) contact as desired to generate a particular pattern on the electrode pad 248. For example, Figure 49 shows the character letter "B" formed by selectively activating particular electrodes 260 on the electrode pad 248. The letter "B" appears to be reversed in Figure 49 because Figure 49 shows the backside 258 of the electrode pad 248. The backside 258 having electrodes 260 would be normally in contact with the wearer or recipient of the information. An electric communication system of the present invention utilizing the electrode pad 248 of Figures 46-49 allows for communication of more complex information to

the recipient. Symbols, characters, words and even sentences could be communicated to the recipient using a low level electric shock. An entirely new language could even be developed around the electric communication system of the present invention.

Figure 50 shows another type of signal which can be communicated using the electric communication system. The low level electric shock can be varied by length of time the shock is applied and length of time between shocks to communicate with a signal such as morse code. A morse code type signal could be used with the matrix type electrode pads 248 of Figures 46-49 or the electrode 24 having a pair of electrical contacts 26 as shown in Figure 2.

Figures 52-55 show an embodiment of the present invention in which the electrode pads are removable and replaceable. A watch type electric communication system 264 has two removable electrode pads 266. The electrode pads 266 can be removably attached to the backside of the watch type system 264 by inserting adaptors 288 into adaptor receptacles 290. The electrode pads 266 may be made to have any desired shape which could provide for a more esthetically pleasing or fashionable watch type system 264.

Figure 56 shows another watch type electric communication system 292 having a removable electrode pad 294 connected to the watch by adapters 296. Portions of the electrode pads 294 may be separated by a non-conductive material

298. The backside 300 of the watch would also be made of a non-conductive material.

Figure 57-60 show another watch type electric communication system 302 having a single adapter receptacle 304. An electrode pad 306 has an adapter 308 which is inserted into the adapter receptacle 304 for mounting the electrode pad 306 to the watch 302. As can be seen in Figure 60, the adapter 308 may have first and second electrical connections 310, 312 spaced apart by a non-conductive material 314. Portions of the electrode pad 306 are connected to the first electrical connector 310 and other portions of the electrode pad 306 are connected to the second electrical connection 312.

Figures 61 and 62 show an adapter pad 314 having adapters 316 and electrodes 318. The adapter pad 314 can be mounted to a watch type electric communication system 292 as shown in Figure 56 by inserting the adapters 316 into the adapter receptacles. The adapters 316 are electrically connected to the electrode 318. An electrically conductive paint can be applied to the adapter pad 314 in contact with the electrodes 318. In this manner, the user of the system can design the shape and color of the painted on electrodes. One alternative to using electrically conductive paint would be to use electrically conductive clay type material. The clay type material can be formed as desired and applied to the adapter pad 314 in contact with the electrodes 318. The electrode pad 314 is

formed of a non-conductive material and whether electrically paint or clay is used, the paint and clay for each one of the electrodes 318 are separated from each other by the non-conductive adapter pad 314.

Figure 63 shows one example of either painted on or clay type electrodes 320 applied to the adapter pad 314.

Figures 64-66 show a navigator 322 having an electric communication system of the present invention. The navigator 322 is a global positioning system used for determining particular directions. A band 324 may be provided for the user of the navigator 322 to wear the navigator 322. Various electrodes 326 are provided to be activated with low level electric shock indicating a particular direction. For example, Figure 66 shows selected electrodes 326 activated to indicate a forward direction. The central inner electrode band 326a and the central outer electrode band 326b may be alternately activated to enhance the feeling of the signal indicating the forward direction.

Another application of an electric communication system according to the present invention could be used to determine the proximity of a particular object to the user of the system. For example, a proximity sensor could be connected to the electric communication system and the low level electric shock will be applied to the user based on the proximity of the user to the desired object. The low level electric shock signal can be varied to indicate the distance that the

user is from the particular object.

Another watch type electric communication system 328 is shown in Figure 67 to illustrate another electrode pad design. The watch type system 328 has one electrode pad 330 of a desired design on the backside of the watch. Another electrode 332 can be provided on the backside of the band 334. In this manner, various designs of the electrode pads 330 can be utilized.

Another watch type electric communication system 336 is shown in Figures 68-69. The watch type system 336 has front air opening 338 and connected to rear air opening 340 by air passageways. A finger activated pump 342 is provided to selectively pump air from either the front or backside of the watch type system 336 to the other side of the watch. A seal 342 is provided on the backside of the watch type system 336 and surrounds electrode pads 344 and the rear air openings 340. The seal 342 contacts the skin of the wearer and protects the electrode pads 344 from liquid or moisture outside of the watch type system 336. A negative pressure may be created on the backside of the watch within the area surrounded by the seal 342 by pumping air from the rear air openings 340 out of the front air openings 338. The negative pressure on the backside of the watch type system 336 may enhance the seal between the wearer's skin and the seal 342 by providing a suction effect. Pumping air from the backside of the watch out of the front air openings 338 also tends to remove

moisture, such as perspiration, from the area by the electrode pads 344. The pump 342 can also pump air from the front air openings 338 out of the rear air openings 340 to the backside of the watch type system 336. The watch type system 336 may be particularly useful in situations where the watch may come in contact with liquid, such as water during swimming or to remove perspiration generated by the wearer. Although a finger activated pump 342 is shown in Figure 68, other types of air pumps could be used with the watch type system 336.

Numerous parameters of the electric communication system according to the present invention can be modified as desired. For example, the size of electrodes, the number of electrodes, location of electrodes, the color of the electrodes, electrode material and weight can be varied. The low level electric shock signal applied to the information recipient can also be varied. For example, the frequency, wave form, amplitude, time period, voltage and amps can be varied. The electric communication system can be used as a substitute for or in addition to existing ways of communication, such as audio and visual communication. Also, the electric communication system can be used to convert visual information (language, pictures, etc.), sonic information (language, music, sounds, etc.) and tactical information (pressure, heat, etc.) into low level electric shock tactical information. The low level electric shock tactical information can then be applied to a recipient to communicate the information.

While the presently preferred embodiments have been illustrated and described, numerous changes and modifications can be made without significantly departing from the spirit and scope of this invention. Therefore, the inventor intends that such changes and modification are covered by the appended claims.

THE INVENTION IS CLAIMED AS:

1. An electric communication system comprising:

a source of low level electric current;

a signal controller connected to the source of low level electric current and having a non-aversive electric current output signal indicative of information desired to be communicated; and

a user contactable electrode electrically connected to the signal controller by the non-aversive electric current output signal.

2. The electric communication system of claim 1, wherein the non-aversive electric current output signal has a low current value which avoids uncomfortable electric shock to a recipient of the non-aversive electric current output signal.

3. The electric communication system of claim 1, wherein the non-aversive electric current output signal is alternating current.

4. The electric communication system of claim 2, wherein the non-aversive electric current output signal provides an electrical shock which is sufficiently low to be medically acceptable.

5. The electric communication system of claim 1, wherein the controller comprises an information producer having information desired to be communicated to a recipient.

6. The electric communication system of claim 1, wherein the non-aversive electric current signal has variable characteristics controlled by the controller, the characteristics selected from the group consisting of voltage, current, waveform, time period, amplitude, frequency and combinations thereof.

7. The electric communication system of claim 1, wherein the electrode comprises a plurality of spaced apart electrodes.

8. The electric communication system of claim 7, wherein the spaced apart electrodes are separated by electrically insulated material.

9. The electric communication system of claim 1, wherein the electrode comprises at least one electrically conductive pad having a plurality of user contactable conductive locations.

10. The electric communication system of claim 9, wherein the

plurality of user contactable conductive locations forms a desired pattern when a selected number of the user contactable conductive locations contain the non-aversive electric current output signal.

11. The electric communication system of claim 1, wherein the electrode is substantially transparent.

12. The electric communication system of claim 1, further comprising an information signal receiver connected to the electrode, and wherein the information signal receiver is capable of receiving an information signal from an information signal producer.

13. The electric communication system of claim 12, wherein the information signal receiver is capable of receiving a wireless information signal.

14. The electric communication system of claim 1, wherein the system is included in a device selected from the group consisting of telephones, pagers, games, watches, personal communicators, vehicles, clocks, computers, appliances, furniture, wearable accessories, wearable computers, cameras, home theaters, writing utensils, personal data assistants, video touch screens and

combinations thereof.

15. The electric communication system of claim 1, wherein the user contactable electrode is worn by a user.

16. An electric communication system comprising:

an electrical contact normally in contact with a user when in use;

an electric power supply; and

an information signal producer electrically connected to the electric power supply and the electrical contact, the information signal producer having an electric output signal to the electrical contact and applied to the user as electric shock, the electric shock defined by electrical characteristics which generally are unoffensive to the user and representative of information to be communicated to the user.

17. The electric communication system of claim 16, wherein the electrical characteristics of the electric shock comprise a current which is medically acceptable.

18. The electric communication system of claim 17, wherein the

electrical contact is selected from the group consisting of a single contact, a plurality of spaced apart contacts, at least one conductive pad, at least one conductive pad having a plurality of conductive areas, selectable conductive areas, and combinations thereof.

19. A method of communication comprising the steps of:

converting a signal indicative of information to be communicated to a recipient into a low level electric current signal;

supplying the low level electric current signal to an electrically conductive electrode in contact with the recipient;

applying a low level electric shock of the electric current signal to the recipient from the electrode.

20. The method of communication of claim 19 further comprising one of the steps of:

a) producing the signal indicative of information to be communicated, and

b) receiving the signal indicative of information to be communicated by transmission from a wireless information signal producer.

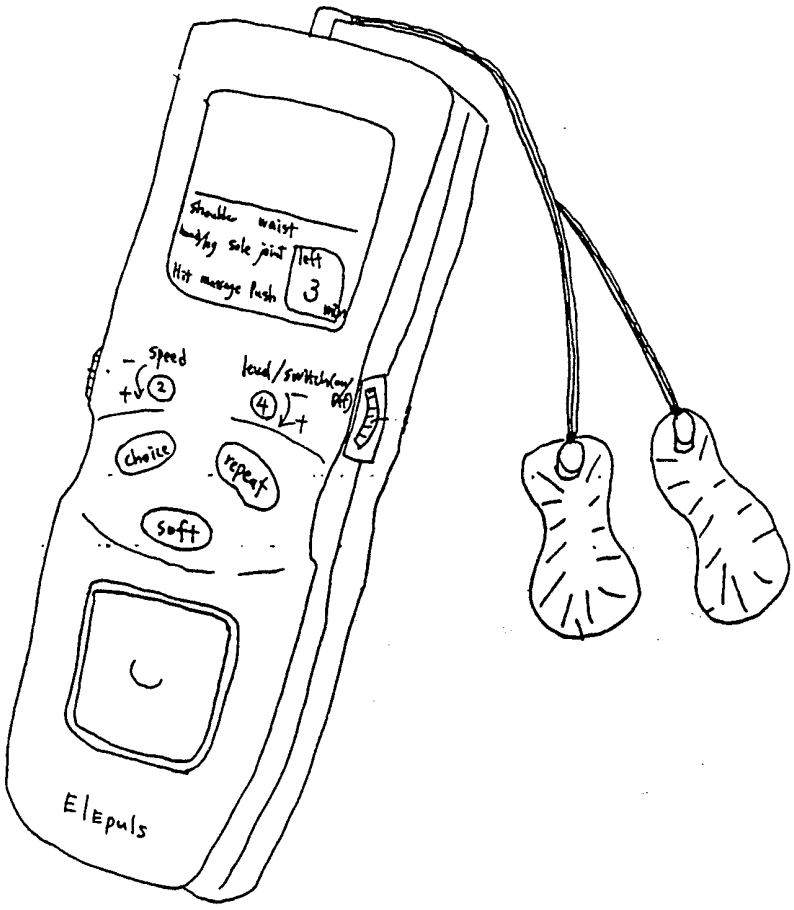


FIG. 1

(PRIOR ART)

FIG. 2

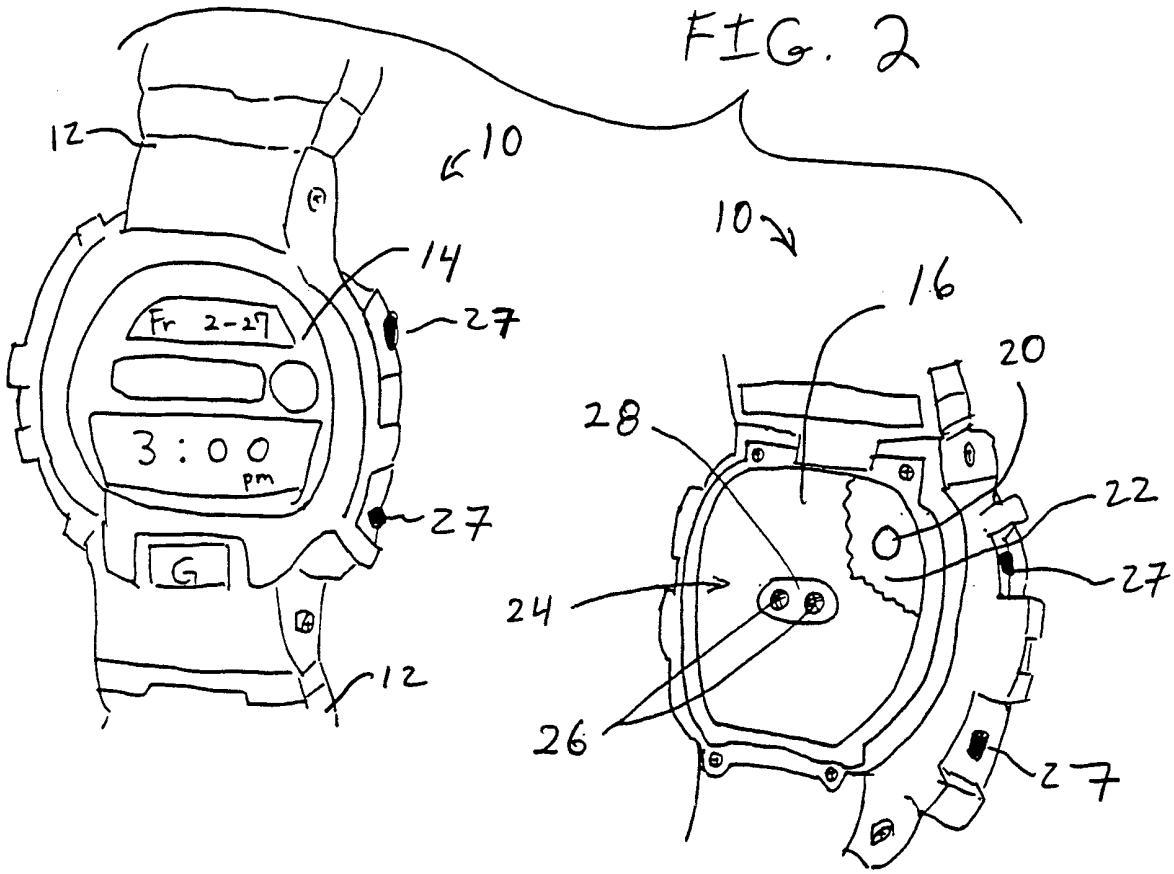
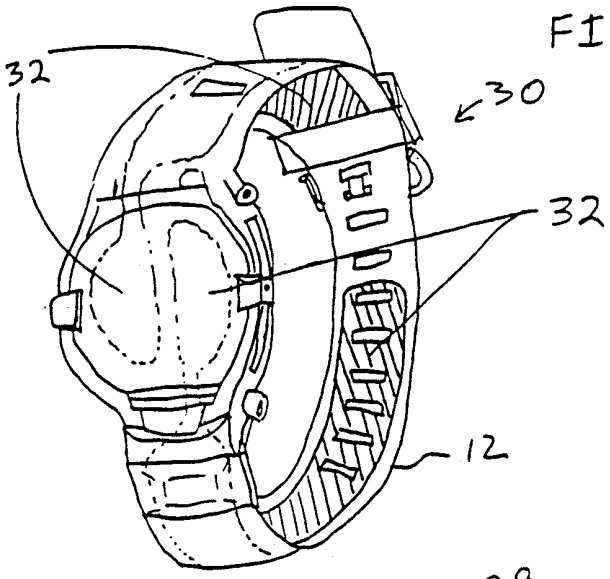


FIG.3



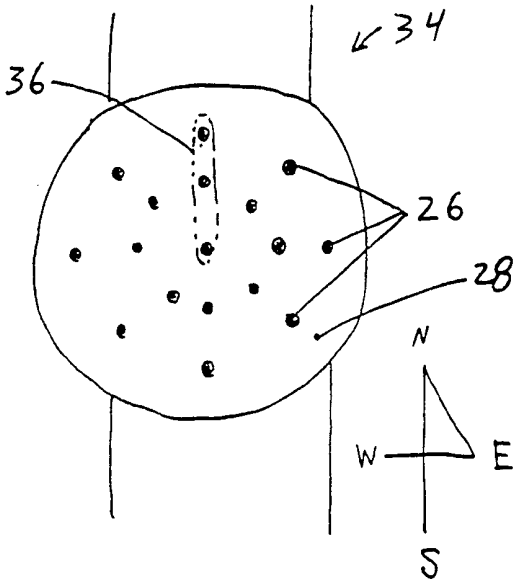


FIG. 4

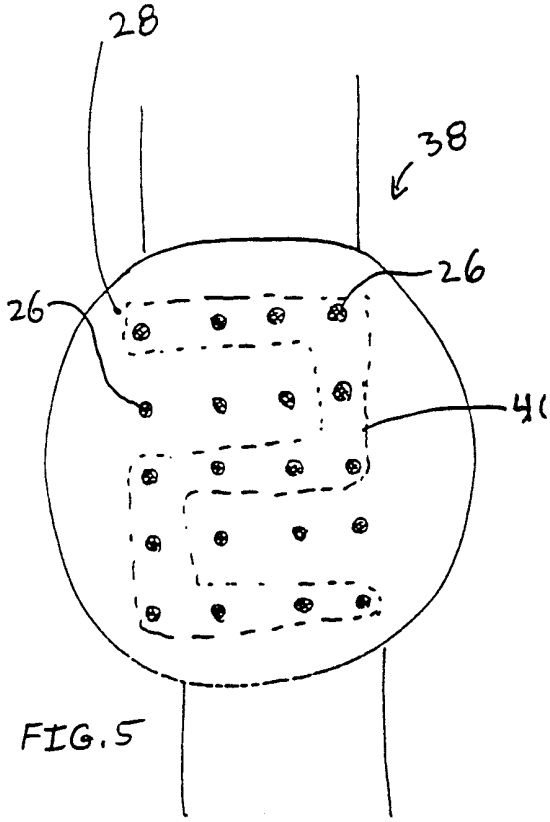


FIG.5

FIG. 6

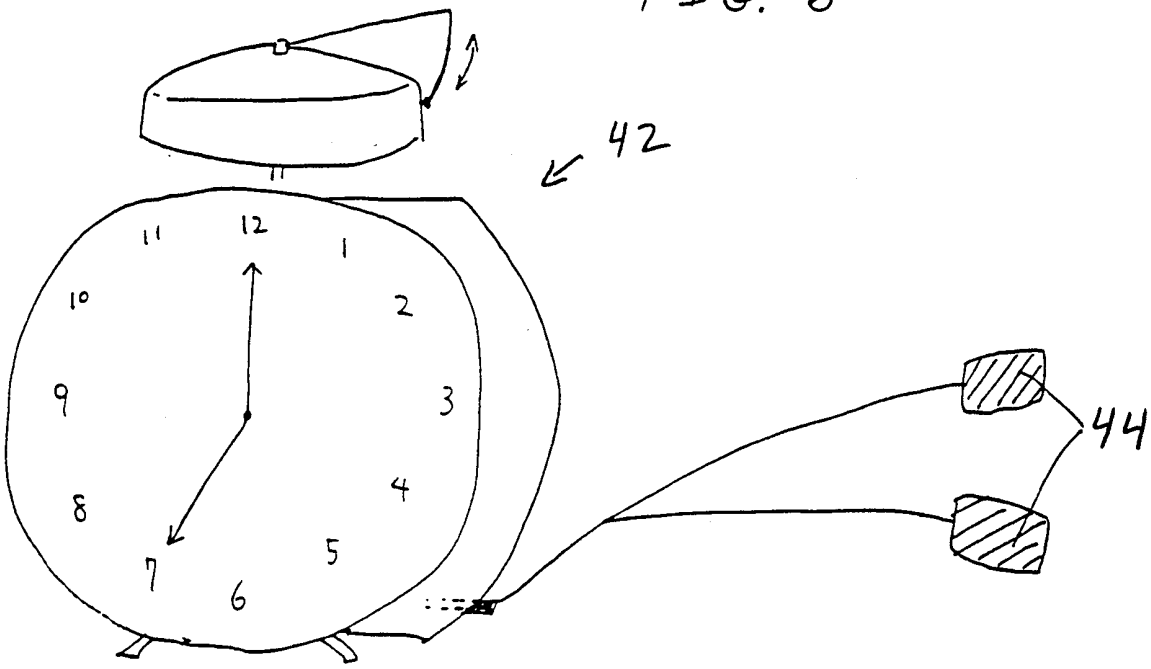


FIG. 7

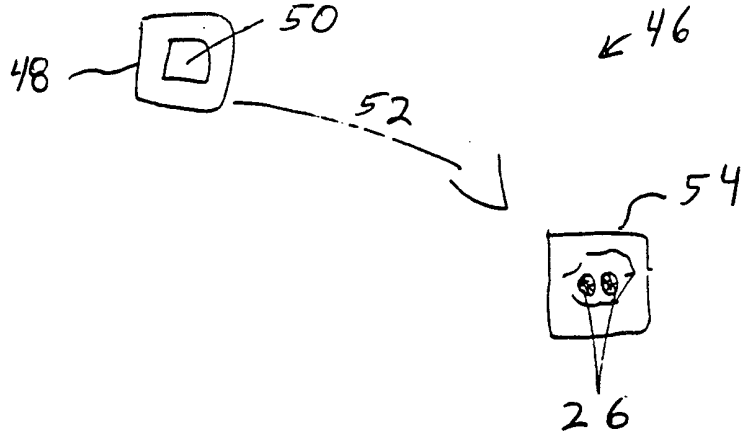


FIG. 8

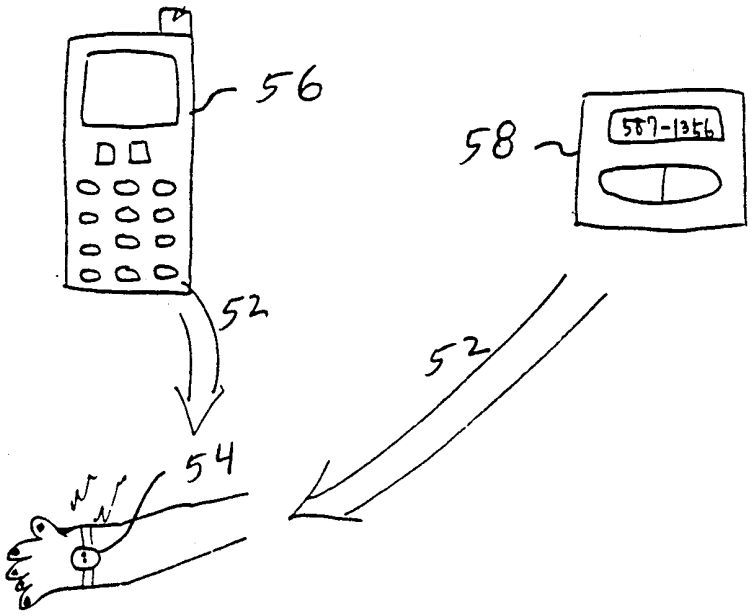
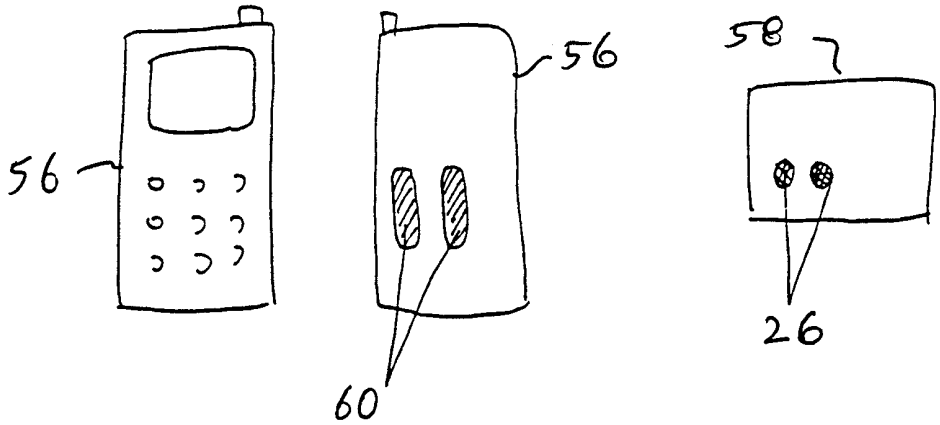


FIG. 9



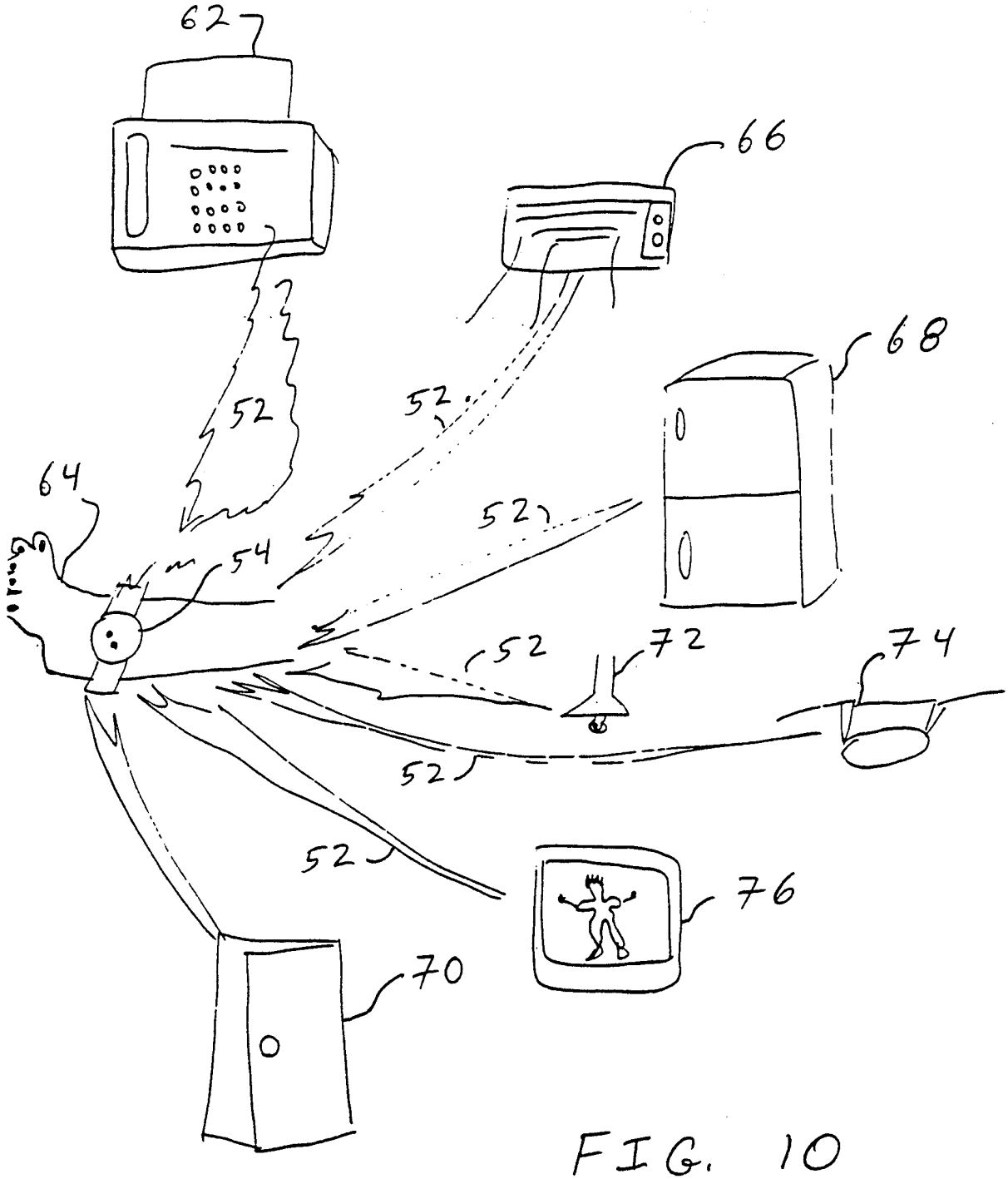


FIG. 10

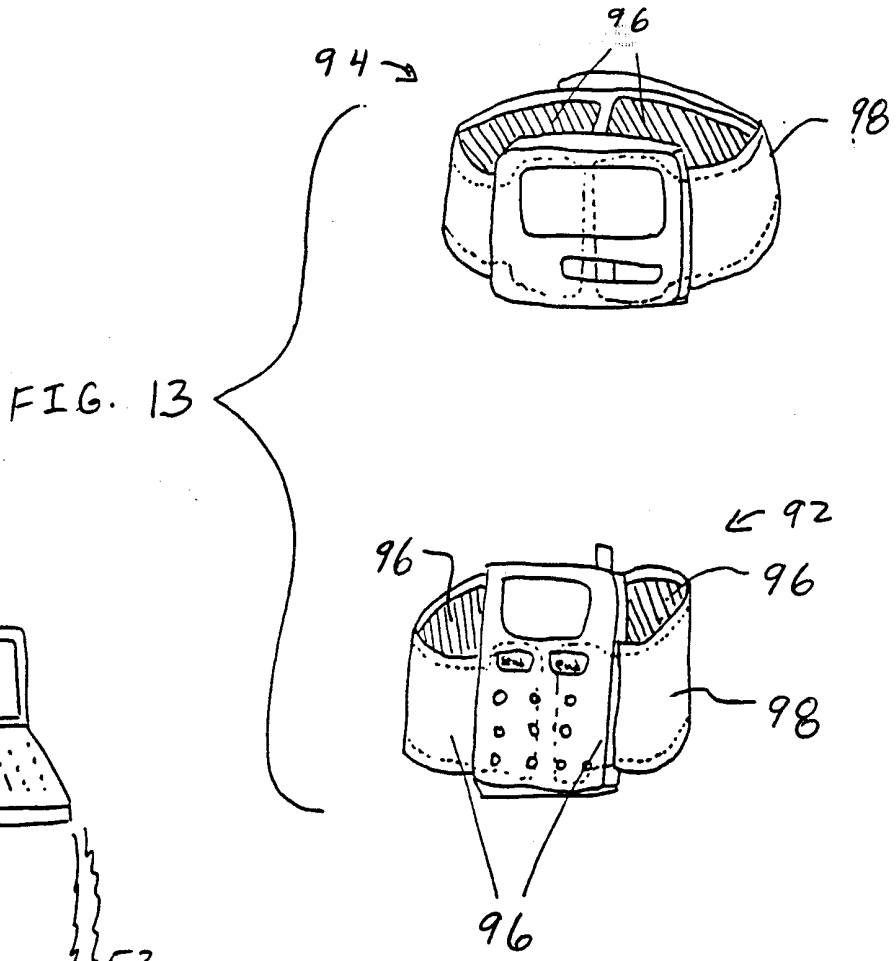


FIG. 13

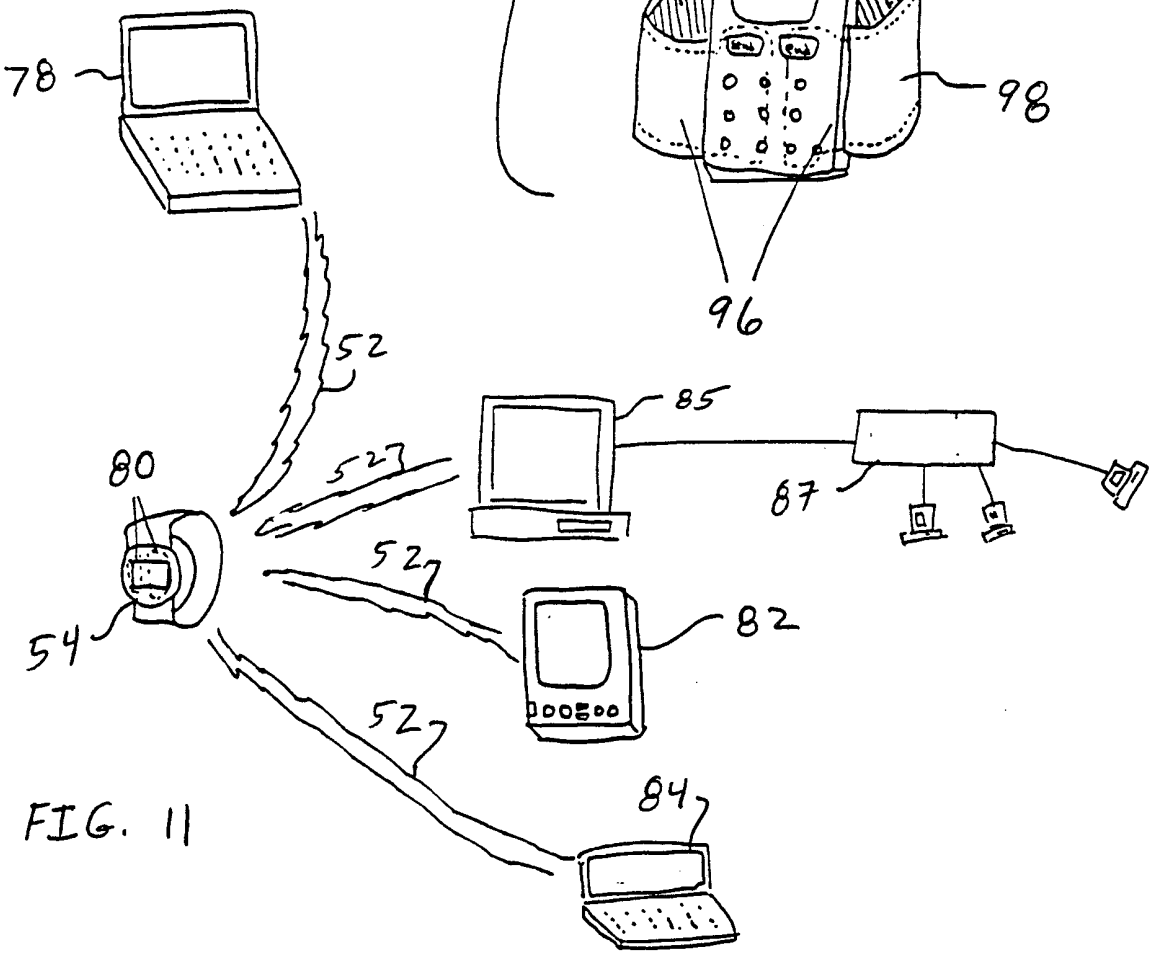
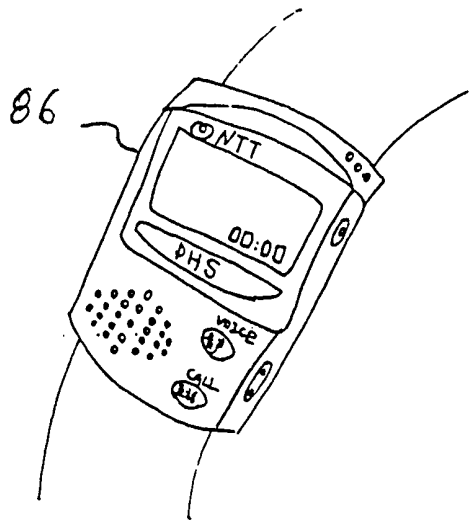


FIG. 11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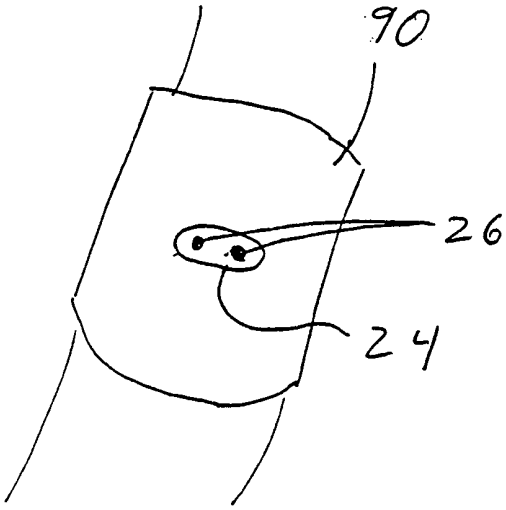
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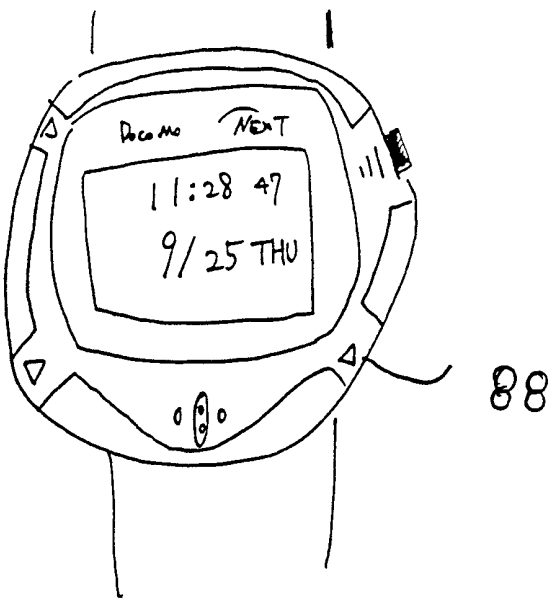
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FIG. 12

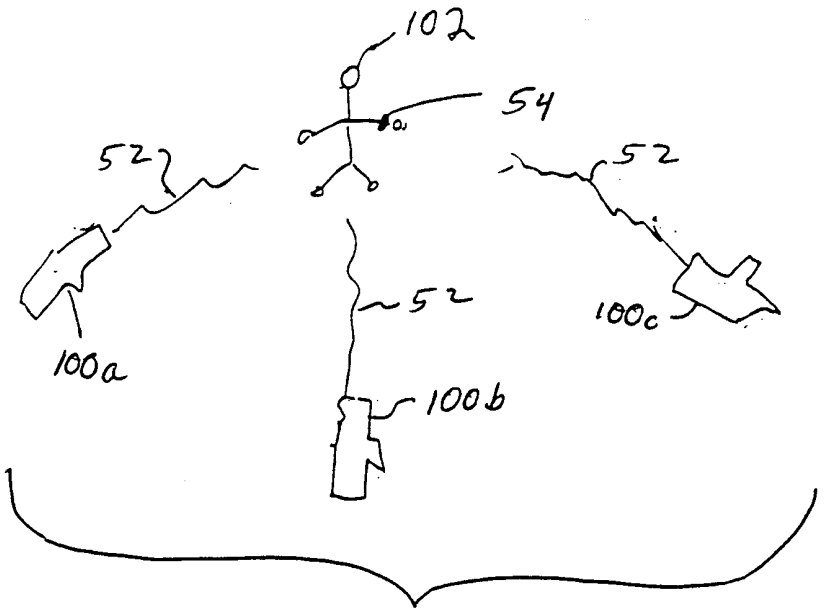


FIG. 14

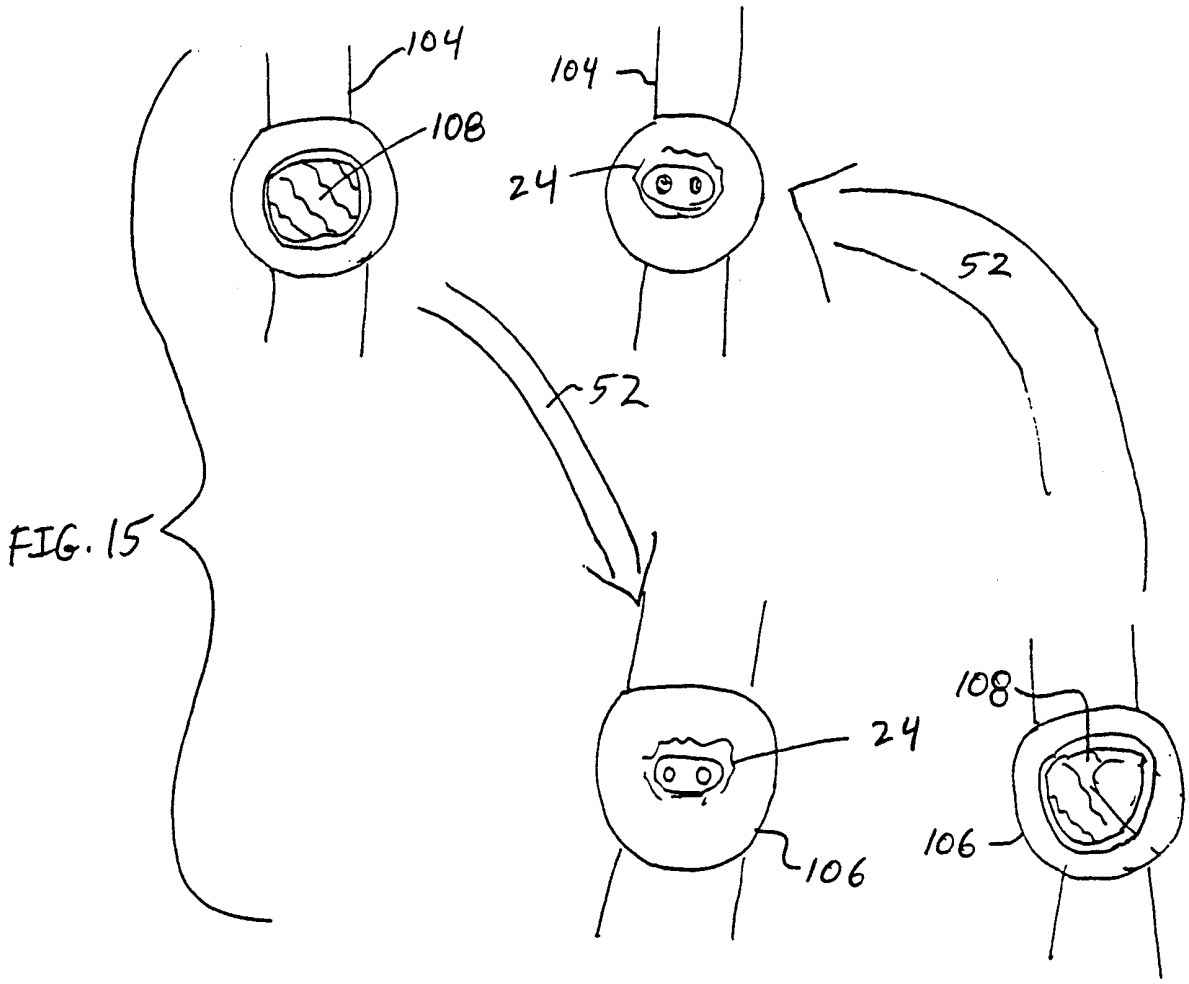


FIG. 15

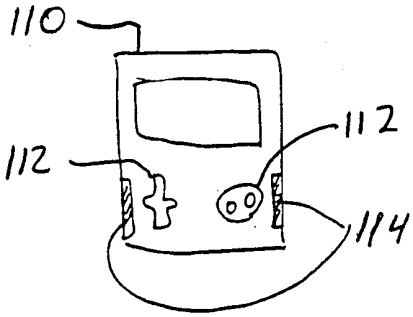


FIG. 16

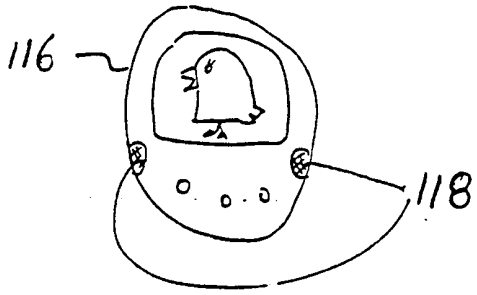


FIG. 17

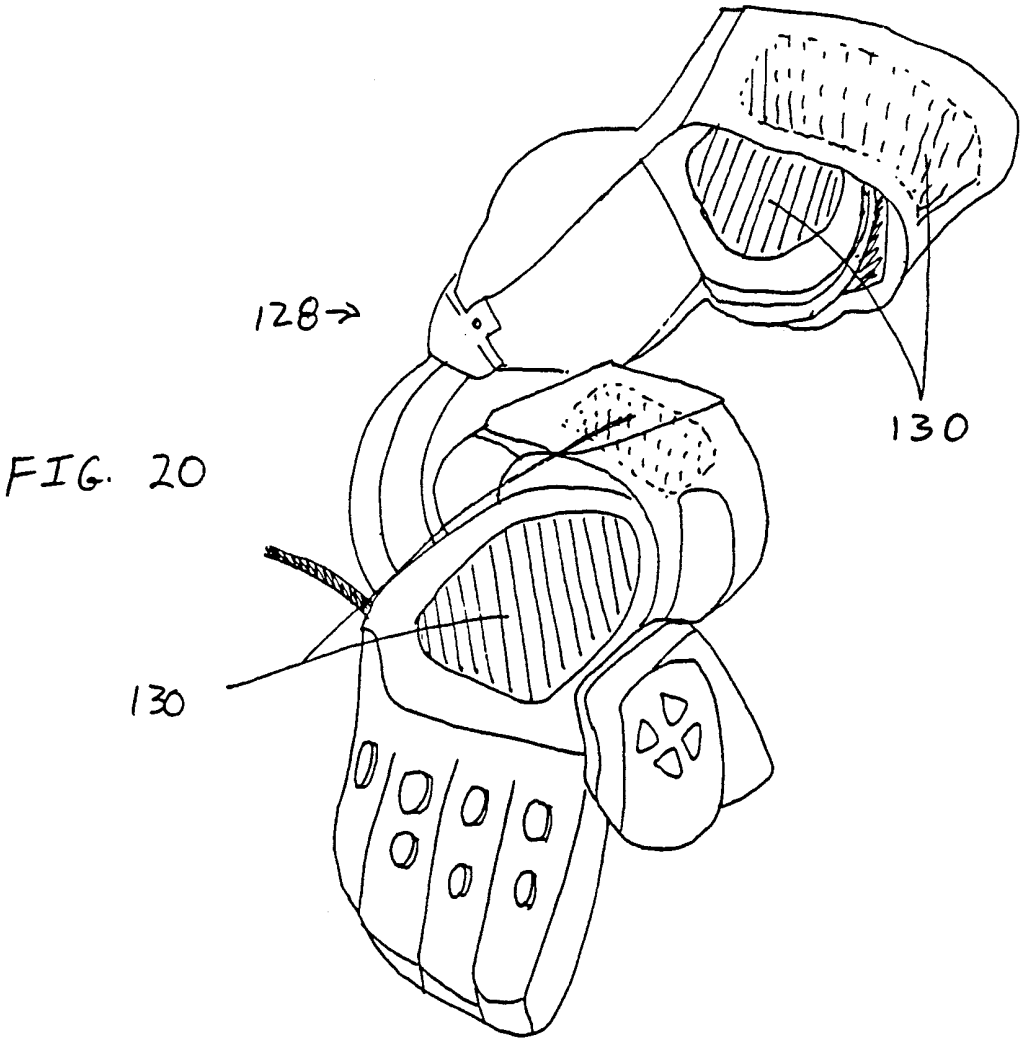


FIG. 20

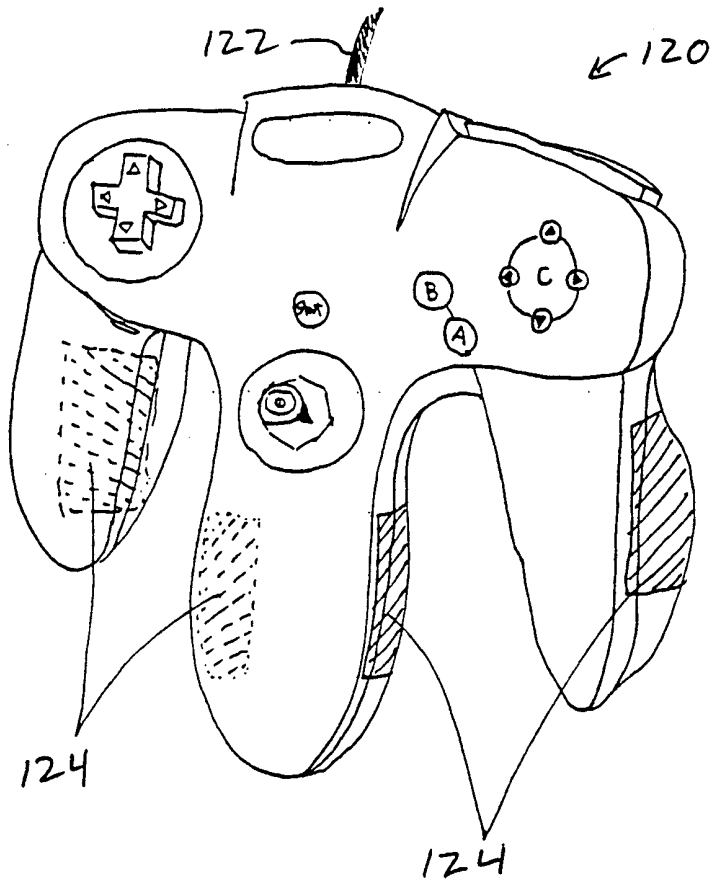


FIG. 18

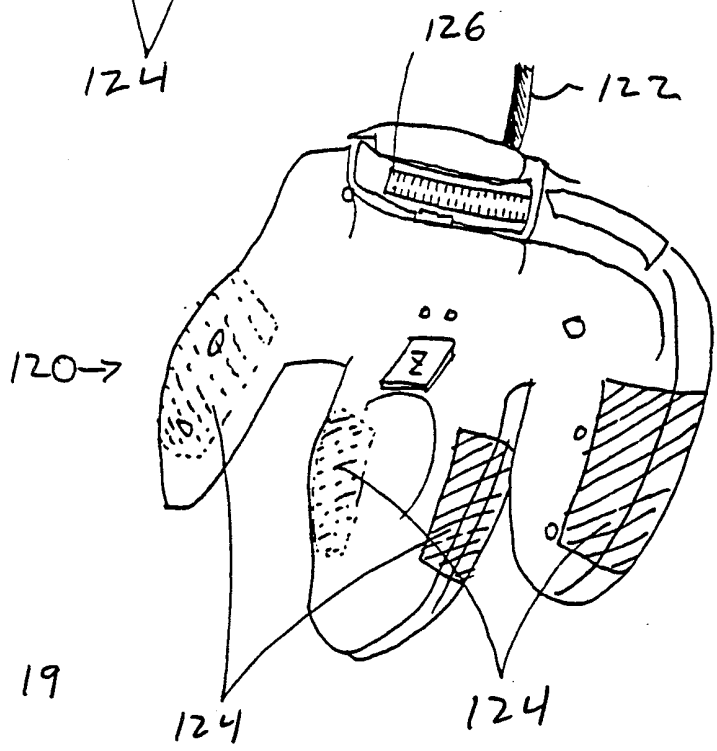


FIG. 19

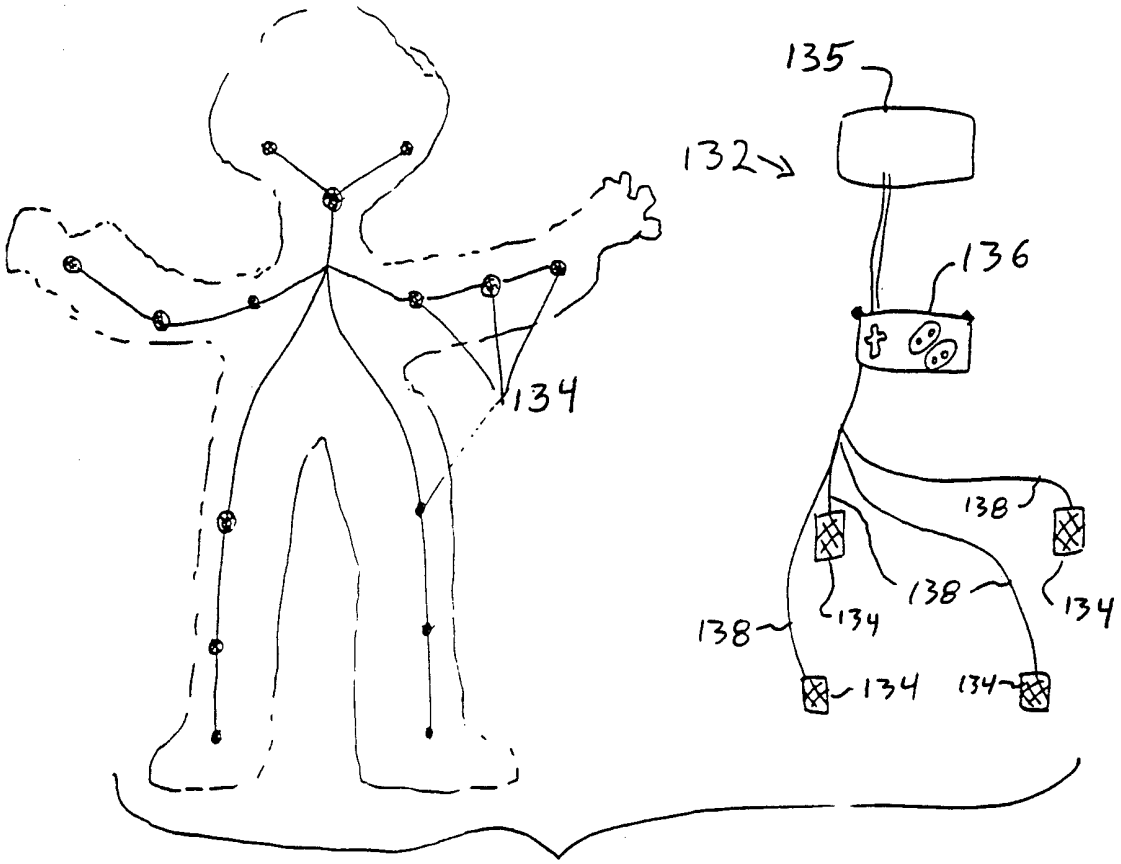


FIG. 21

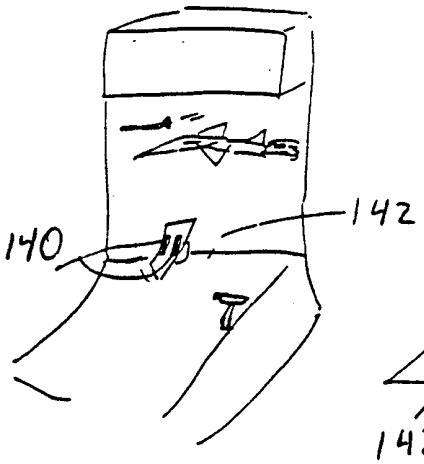


FIG. 22

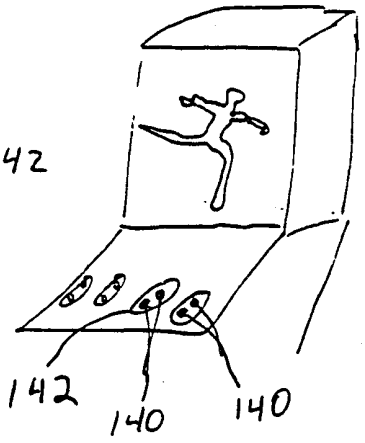


FIG. 23

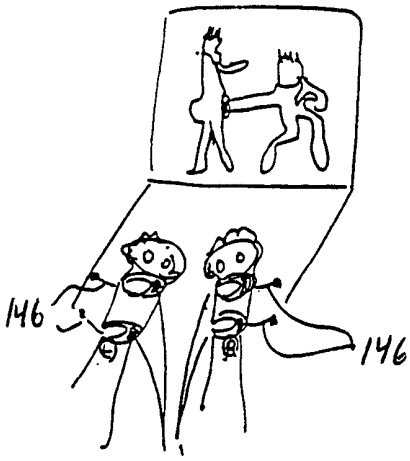


FIG. 24

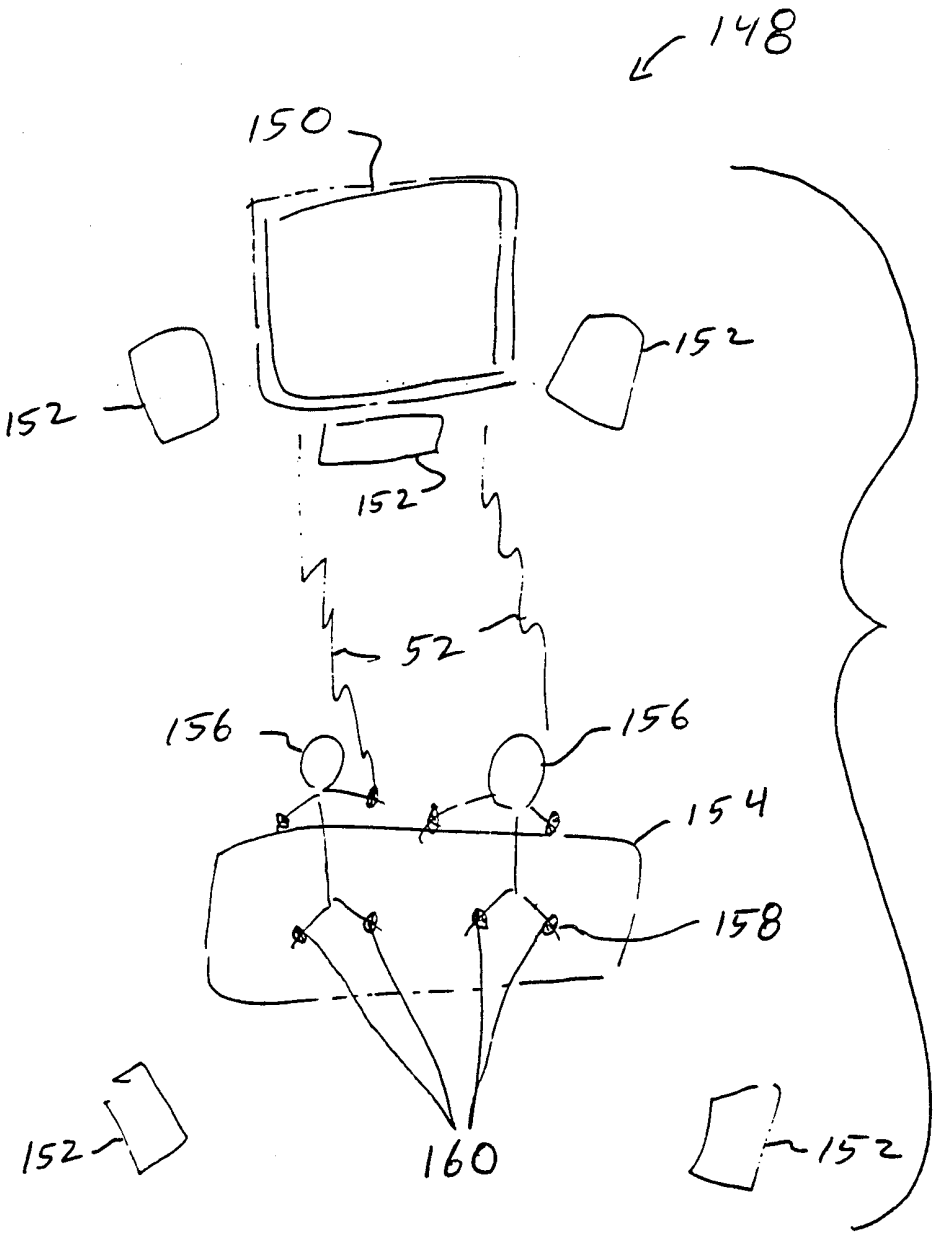


FIG. 25

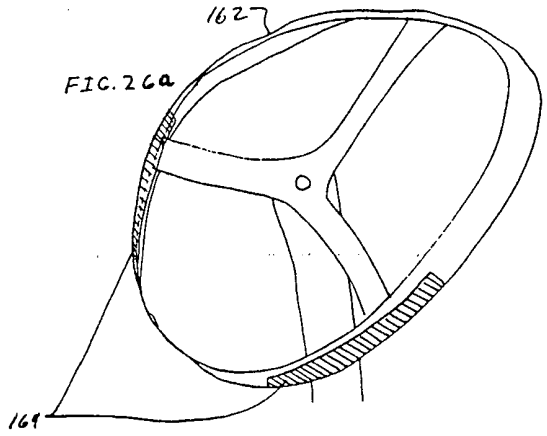


FIG. 26a

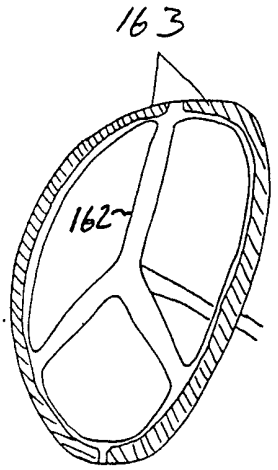


FIG. 26b

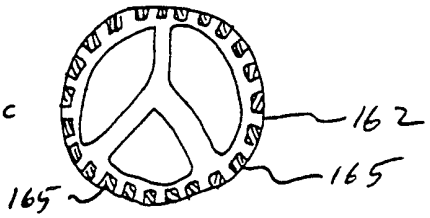


FIG. 26c

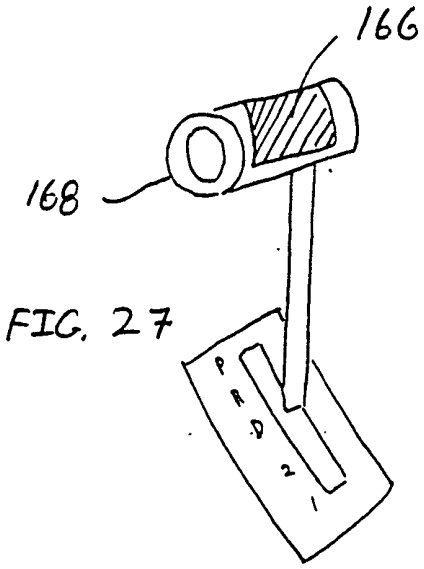


FIG. 27

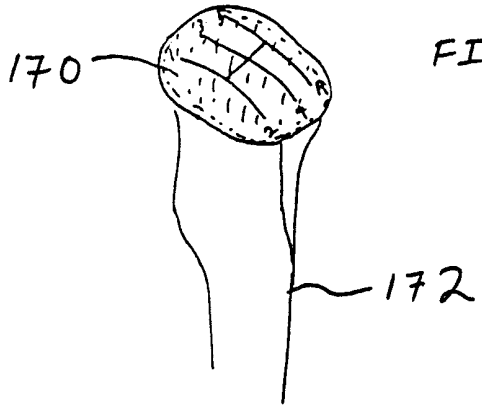


FIG. 28

FIG. 31

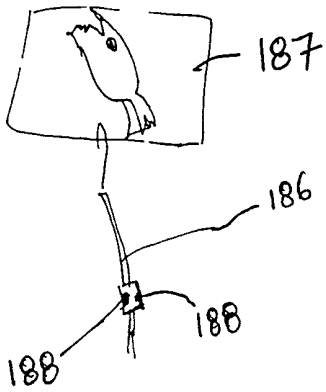
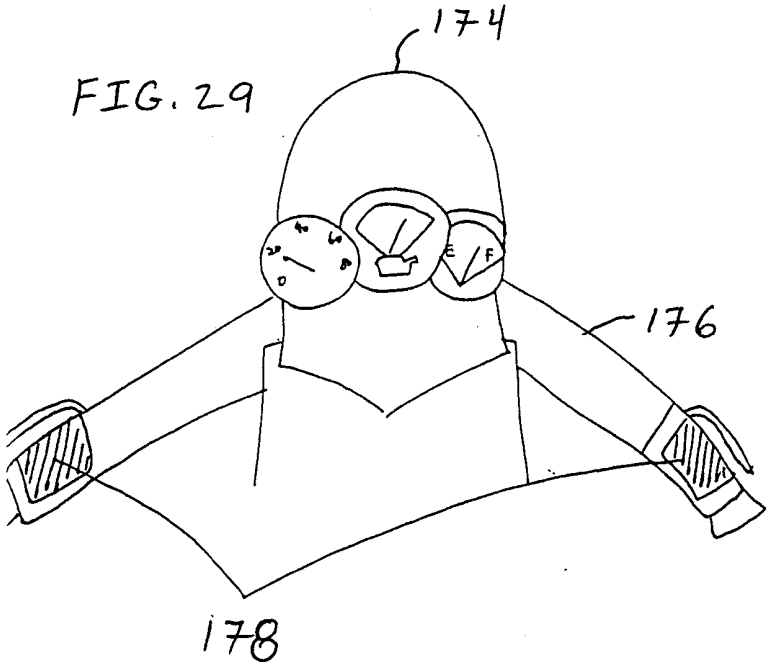


FIG. 29



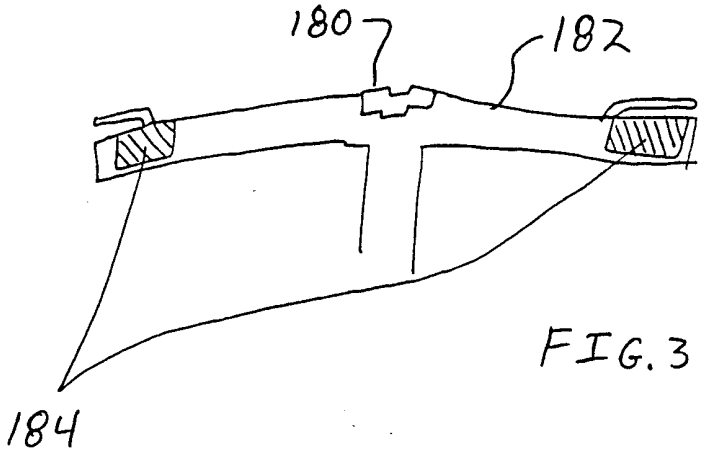


FIG. 30

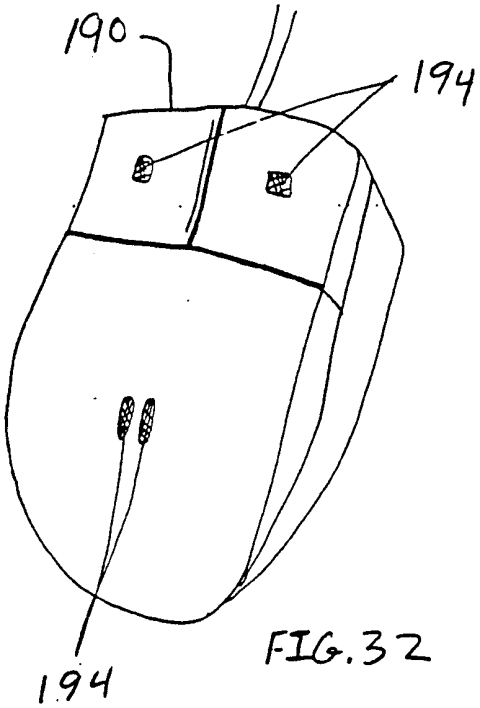
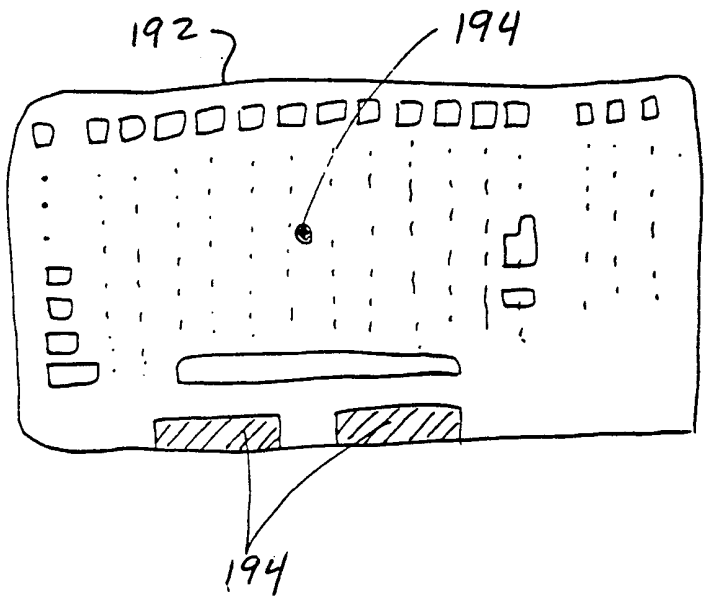


FIG. 32

FIG. 33



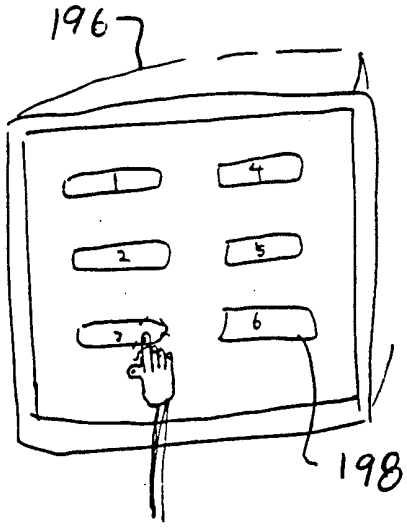


FIG. 34

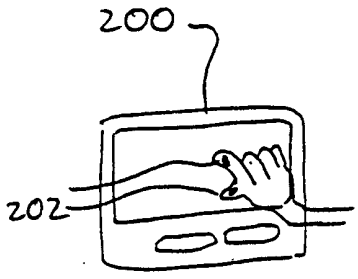


FIG. 35

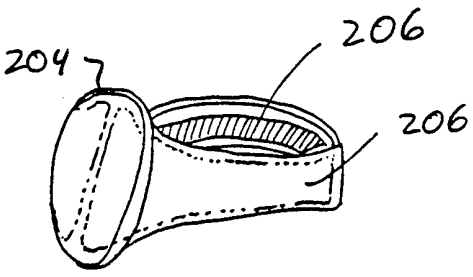


FIG. 36

FIG. 37

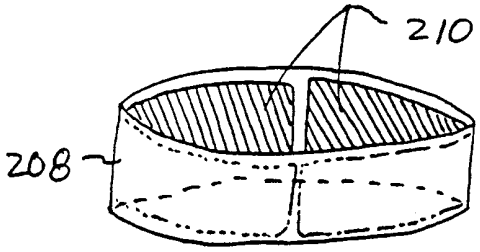


FIG. 38

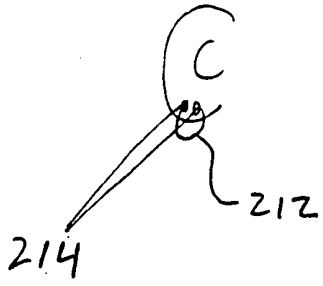
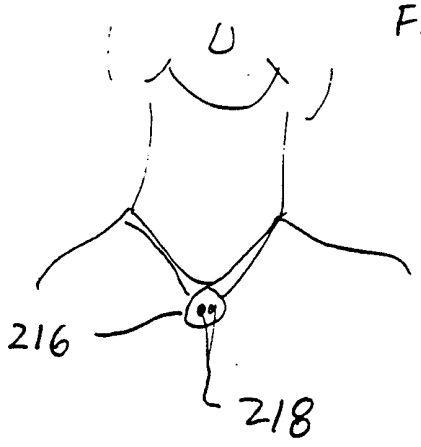


FIG. 39



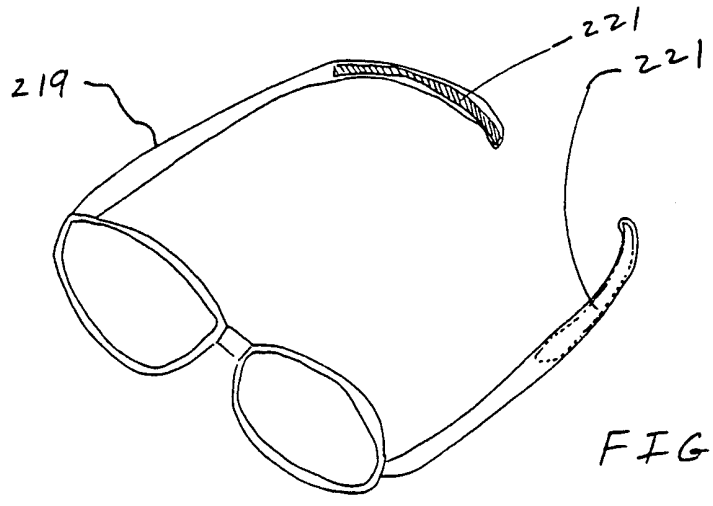


FIG. 51

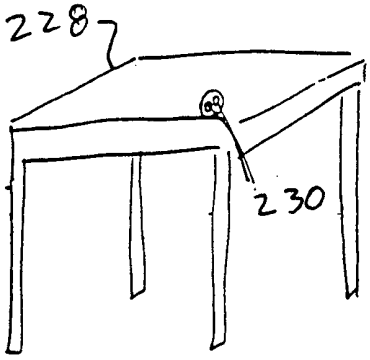


FIG. 42

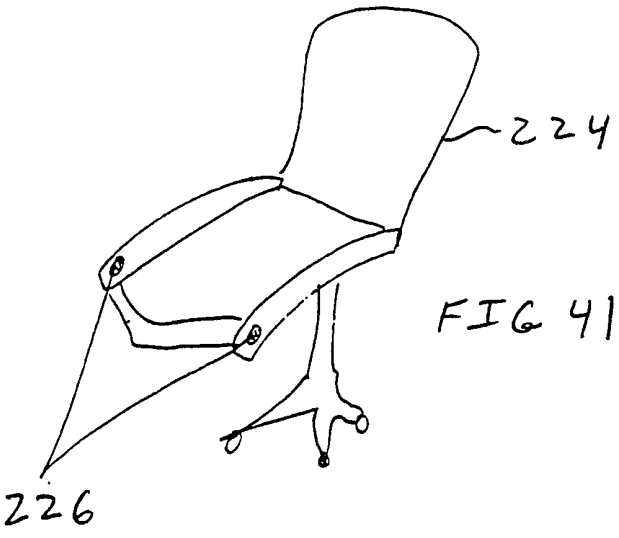
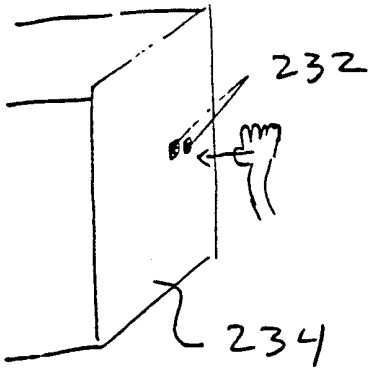


FIG 41

FIG. 43



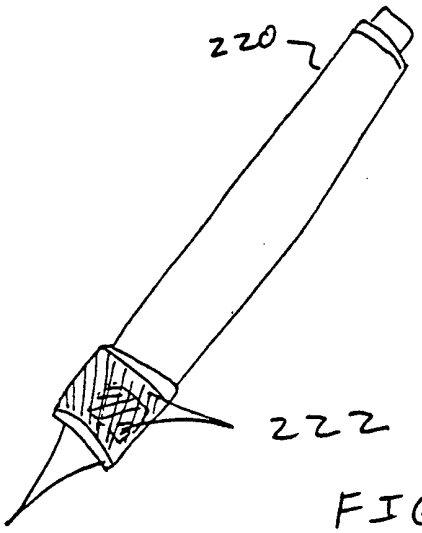


FIG. 40

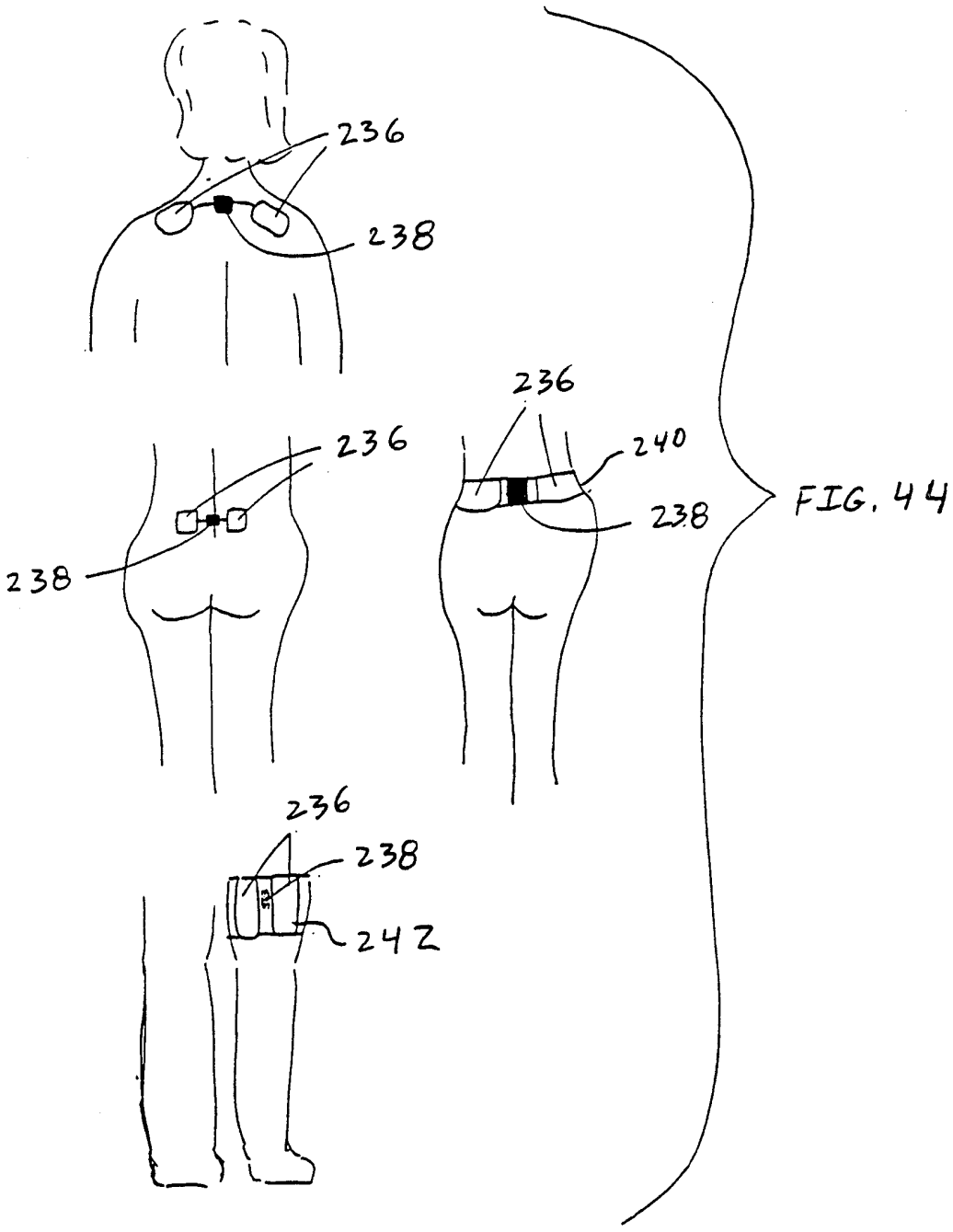


FIG. 44

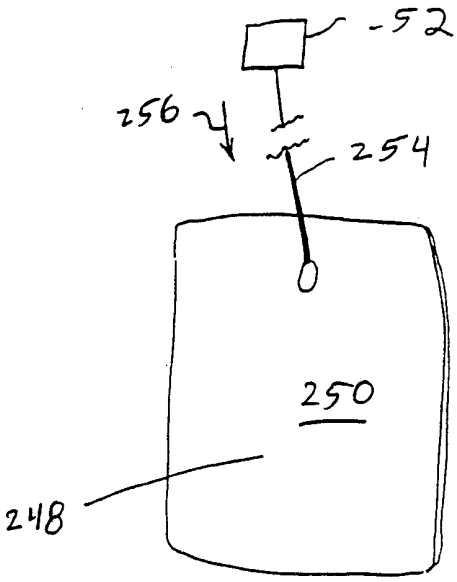


FIG. 46

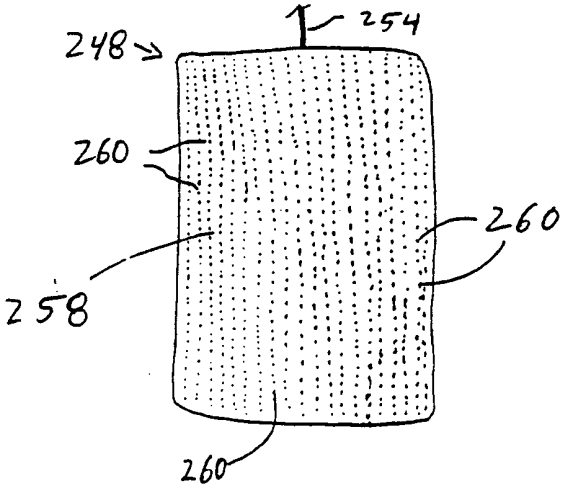


FIG. 47

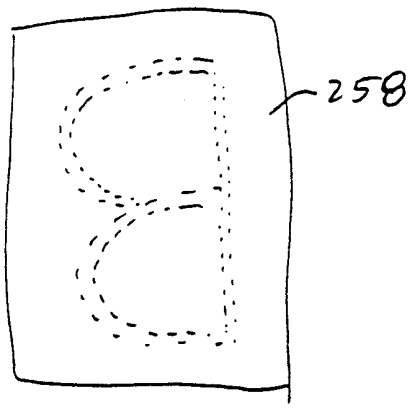


FIG. 49

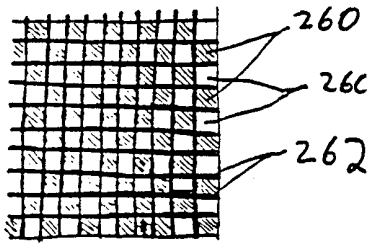


FIG. 48

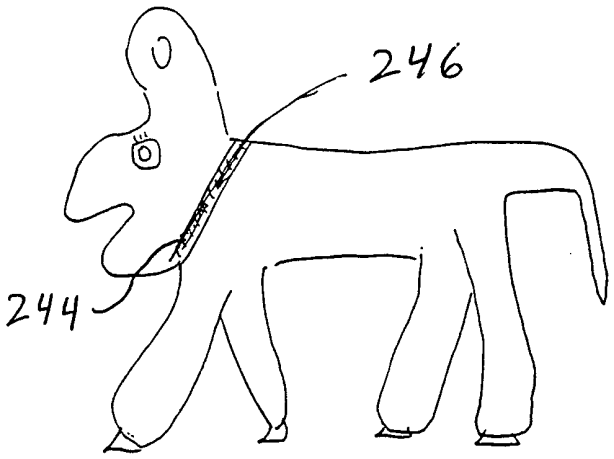


FIG. 45

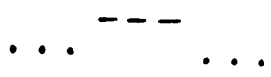


FIG. 50

FIG. 53

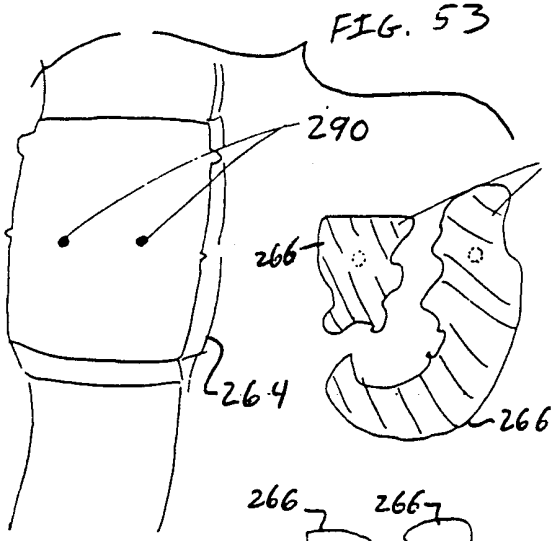
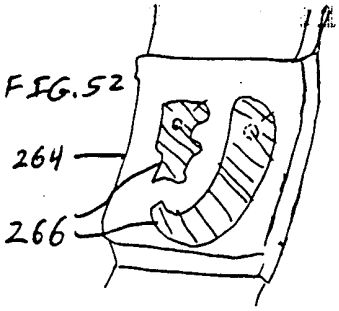


FIG. 52



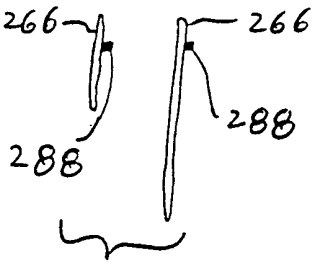


FIG. 55

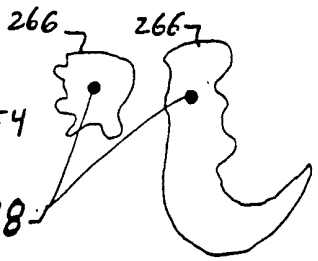
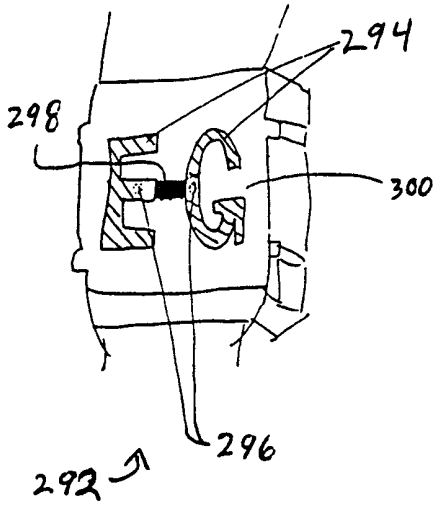


FIG. 54

FIG. 56



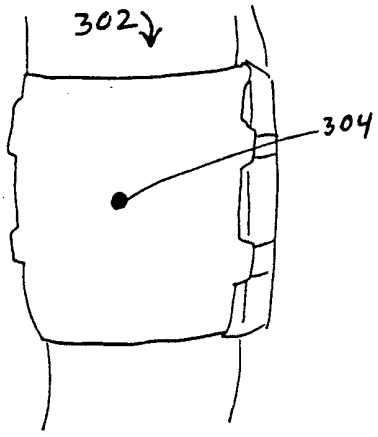
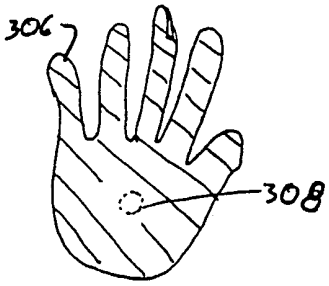


FIG. 57

FIG. 58



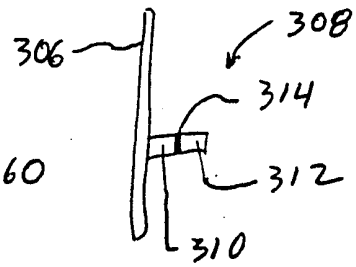


FIG. 60

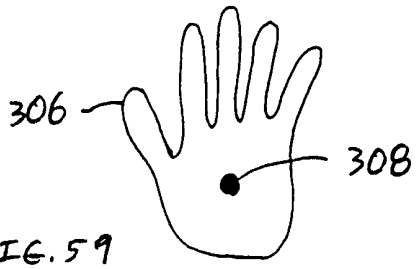


FIG. 59

FIG. 64

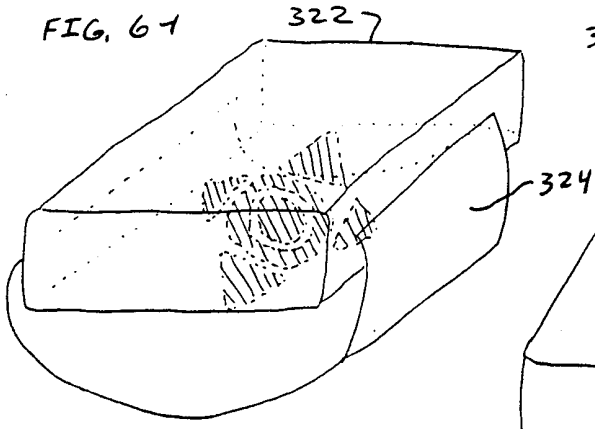
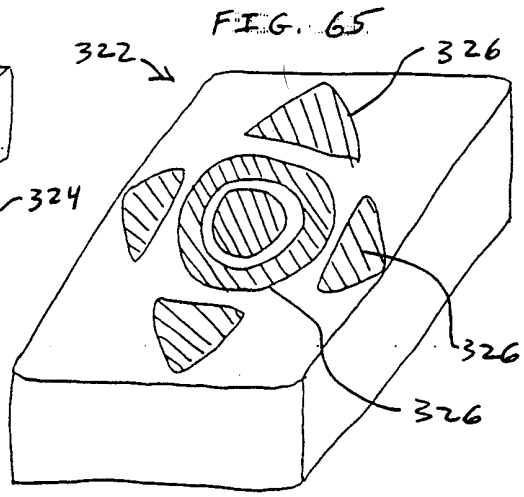


FIG. 65



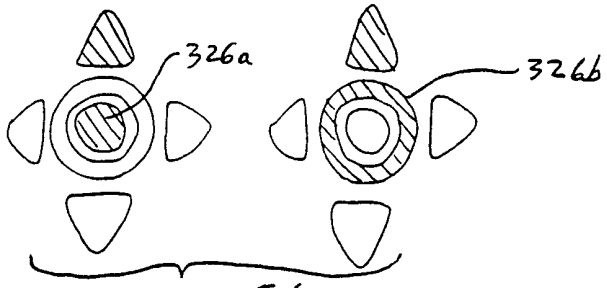


FIG. 66

FIG. 67

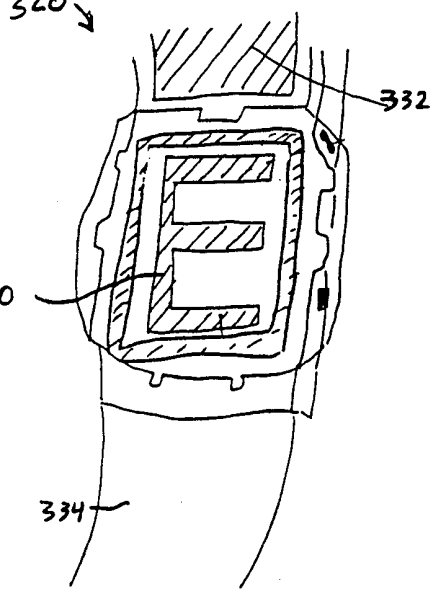


FIG. 62

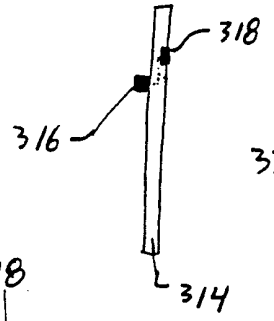
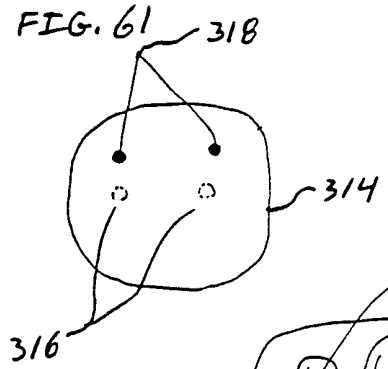


FIG. 61



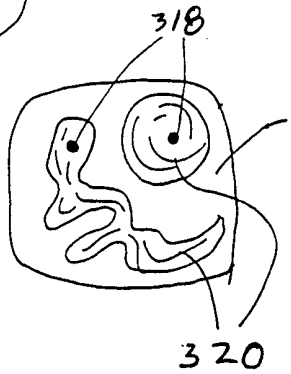


FIG. 63

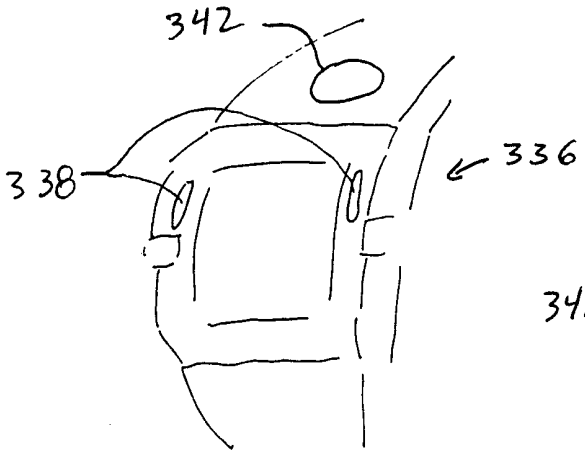


FIG. 68

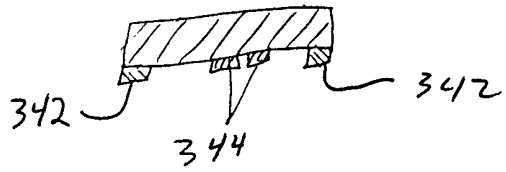


FIG. 70

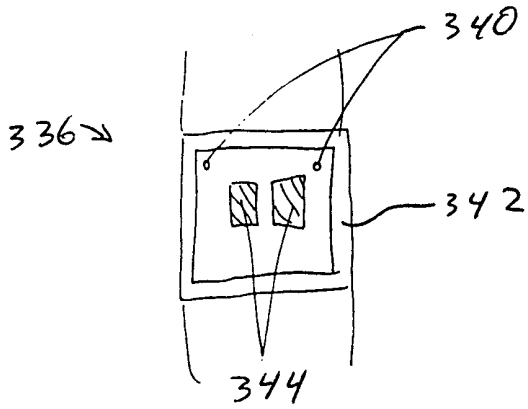


FIG. 69