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Transmitted herewith for filing is the patent
application of:

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For: STEREO AUDIO HEADPHONE APPARATUS FOR A USER HAVING A HEARING LOSS
AND RELATED METHODS

Enclosed are:

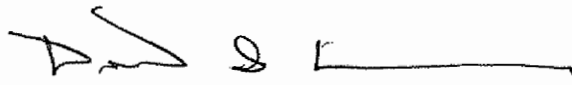
- ☒ Patent Application: 38 pages, 25 claims
- ☒ 12 sheets of drawings. The suggested drawing figure to be published is FIG. 1
- ☒ Applicant qualifies as a small entity under 37 CFR § 1.27.
- ☒ A declaration and power of attorney

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TOTAL CLAIMS	25	-20	5	X 26	\$ 130	X 52	\$
INDEP CLAIMS	3	- 3	0	X 110	\$ 0	X 220	\$
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HIMPP 1027

**STEREO AUDIO HEADPHONE APPARATUS FOR A USER
HAVING A HEARING LOSS AND RELATED METHODS**

Field of the Invention

[0001] The present invention relates to the field of stereo audio, and, more particularly, to stereo audio headphone devices and related methods.

Background of the Invention

[0002] A portable stereo audio playing device has become increasingly popular among people for entertainment. For example, a person may use a portable stereo audio playing device for entertainment while exercising at a gym, during a period of long travel, or during periods of inactivity.

[0003] A typical portable stereo audio playing device may include a housing and a memory for storing digital music data. The portable audio playing device may also include a controller for playing back the stored digital music data. Inputs for controlling the music selection and output volume, for example, may be carried by the housing. A port for coupling wired headphones or earphones for audio output is also typically carried by the housing. One example of a portable stereo audio playing device may be the Ipod® from the Apple Corporation of Cupertino, California.

[0004] Another type of portable stereo audio playing device may include a pair of housings, each one of the pair worn over a respective ear of a user. Headphones or earphones (audio output transducers) may be integrated into the housings. A structural support member that is worn on a user's head, or extends around a user's head, typically couples the housings. The structural support member may also interfere with a person's mobility, for example, while exercising, and more particularly, if protective head equipment is worn, for example.

[0005] U.S. Patent Application Publication No. 2007/0037615 to Glezerman discloses first and second earpieces. The first earpiece includes a speaker and a first module for communicating with an electronic device, for example, a cellular phone. A second module transmits a signal to a second earpiece. The second earpiece includes a receiver to receive signals from the second module and a speaker.

[0006] U.S. Patent No. 7,206,429 to Vossler discloses an audio player that includes a first ear module that includes components (speaker, microphone, memory, battery) for playing digital music. The ear module is coupled to a hub, which is worn on the lobe of the ear and can provide digital audio signals to the ear module, as well as interface with peripheral devices, such as Bluetooth transceivers. A second ear module may be provided and may coordinate with the first ear module to play audio via wireless communication provided by a peripheral device, within the ear modules themselves, or within the hub. In some embodiments, the circuitry in the hub is disclosed as being incorporated in the housings.

[0007] Still further, a typical portable stereo audio playing device may not address a user's hearing shortcomings. For example, a typical portable stereo audio playing device may not include detailed adjustments for sound quality beyond volume, bass, and treble. More particularly, a person that may have hearing loss for example, may not be able to hear or enjoy audio played from a typical audio playing device, or listen to music having a reduced quality.

[0008] Moreover, a typical portable audio playing device may not address fitment. In other words, a typical portable stereo audio playing device may not increase comfort, reduce strain on the physical ear, and reduce stress within an ear canal, while improving audio quality, especially for a person that suffers from hearing loss.

Summary of the Invention

[0009] In view of the foregoing background, it is therefore an object of the present invention to provide frequency equalized stereo audio to a hearing impaired user.

[0010] This and other objects, features, and advantages in accordance with the present invention are provided by a stereo audio headphone apparatus for a user having hearing loss that may include a master headphone unit including a master housing to be independently carried behind an ear of the user, and master circuitry carried by the master housing. The master circuitry may include a stereo audio source and a wireless transmitter coupled thereto. The master headphone unit may also include a master audio output device carried by the master housing and coupled to the

master circuitry for playing a first stereo audio channel from the stereo audio source.

[0011] The stereo audio headphone apparatus may also include a slave headphone unit including a slave housing to be independently carried behind another ear of the user, and slave circuitry carried by the slave housing. The slave circuitry may include a wireless receiver cooperating with the wireless transmitter. The slave headphone unit may also include a slave audio output device carried by the slave housing and coupled to the slave circuitry for playing a second stereo audio channel from the stereo audio source.

[0012] The stereo audio headphone apparatus may also include first and second independently settable frequency equalizers for the first and second stereo audio channels to permit independent selection of frequency equalization to compensate for the hearing loss of the user. Accordingly, the stereo audio headphone apparatus provides frequency equalized stereo audio to a hearing impaired user.

[0013] The first independently settable equalizer may be carried by the master housing, for example. The second independently settable equalizer may also be carried by the slave housing. Alternatively, the first and second independently settable equalizers may be both carried by the master housing.

[0014] The master headphone unit may further include a master audio input device carried by the master housing and coupled to the master circuitry. The master circuitry may be operable in a pass-through mode with audio sensed by the master audio input device being delivered to the master audio output device via the first independently settable equalizer, for

example. The slave headphone unit may similarly include a slave audio input device carried by the slave housing and coupled to the slave circuitry. The slave circuitry may also be operable in the pass-through mode with audio sensed by the slave audio input device being delivered to the slave audio output device via the second independently settable equalizer, for example.

[0015] The master circuitry may also be operable in an impulse noise rejecting pass-through mode to reject impulse noise. The slave circuitry may also be operable in the impulse noise rejecting pass-through mode.

[0016] The master audio output device may include a master electrical-to-acoustical (E/A) transducer and a master audio delivery tube having a proximal end coupled to the master E/A transducer and a distal end to be positioned adjacent an ear canal of the user, for example. The slave audio output device may include a slave E/A transducer, and a slave audio delivery tube having a proximal end coupled to the slave E/A transducer and a distal end to be positioned adjacent another ear canal of the user. The master audio output device may further include a master ear fitting coupled to the distal end of the master audio tube, and the slave audio output device may further include a slave ear fitting coupled to the distal end of the slave audio tube, for example.

[0017] The master audio delivery tube may be selectively extendible from adjacent portions of the master housing. The slave audio delivery tube may also be selectively extendible from adjacent portions of the slave housing, for example.

[0018] Alternatively, the master audio output device

may include a master electrical-to-acoustical (E/A) transducer to be positioned adjacent an ear canal of the user, for example. The slave audio output device may also include a slave E/A transducer to be positioned adjacent another ear canal of the user.

[0019] The master audio output device may also include a master ear fitting coupled to the master E/A transducer. The slave audio output device may also include a slave ear fitting coupled to the slave E/A transducer.

[0020] The master housing may have an arcuate shape. The slave housing may also have an arcuate shape, for example. The stereo audio headphone apparatus may also include a remote control unit operatively coupled to at least one of the master and slave headphone units, such as via a wired or wireless link, for example.

[0021] The master headphone unit may include a master rechargeable power supply coupled to the master circuitry. The slave headphone unit may also include a slave rechargeable power supply coupled to the slave circuitry. The stereo audio headphone apparatus may also include a recharging station to receive the master and slave headphone units for recharging the master and slave rechargeable power supplies, respectively, for example.

[0022] A method aspect is directed to a method for compensating for hearing loss of a user. The method may include providing a master headphone unit including a master housing to be independently carried behind an ear of the user, master circuitry carried by the master housing and including a stereo audio source and a wireless transmitter coupled thereto, and a master audio output device carried by the master housing and

coupled to the master circuitry for playing a first stereo audio channel from the stereo audio source.

[0023] The method may also include providing a slave headphone unit including a slave housing to be independently carried behind another ear of the user, slave circuitry carried by the slave housing and including a wireless receiver cooperating with the wireless transmitter, and a slave audio output device carried by the slave housing and coupled to the slave circuitry for playing a second stereo audio channel from the stereo audio source, for example. The method further includes independently setting first and second independently settable frequency equalizers for the first and second stereo audio channels to compensate for the hearing loss of the user.

Brief Description of the Drawings

[0024] FIG. 1 is an elevational view of a stereo audio headphone apparatus in accordance with the present invention.

[0025] FIG. 2 is schematic block diagram of the stereo audio headphone units of the apparatus of FIG. 1.

[0026] FIG. 3 is a rear elevational view of a stereo audio headphone of FIG. 1.

[0027] FIG. 4 is a bottom view of the stereo audio headphone of FIG. 3.

[0028] FIG. 5a-5b are graphs of a hearing threshold across different frequencies for a user's left and right ears.

[0029] FIG. 6 is a schematic diagram of the stereo audio headphone apparatus of FIG. 1 positioned in a recharging station and coupled to a personal computer

in accordance with the present invention.

[0030] FIG. 7 is a partial cross-sectional view of a user's ear with a stereo audio headphone unit coupled thereto in accordance with the present invention.

[0031] FIGS. 8a-8c are side elevational views of different embodiments of removably coupled ear inserts of the stereo headphone apparatus of FIG. 1.

[0032] FIG. 9 is a schematic block diagram of another embodiment of the stereo audio headphone apparatus in accordance with the present invention.

[0033] FIG. 10 is a side elevational view of another embodiment of a stereo audio headphone unit in accordance with the present invention.

[0034] FIG. 11 is an enlarged cross-sectional view of the stereo audio delivery tube and housing of the stereo audio headphone unit of FIG. 10.

[0035] FIG. 12 is a side elevational view of another embodiment of a stereo audio headphone unit in accordance with the present invention.

[0036] FIG. 13 is an enlarged cross-sectional view of another embodiment of the stereo audio headphone unit of FIG. 10.

Detailed Description of the Preferred Embodiments

[0037] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to

those skilled in the art. Like numbers refer to like elements throughout, and prime notation is used to indicate similar elements in alternative embodiments.

[0038] Referring initially to FIGS. 1-4, a stereo audio headphone apparatus **20** for a user having hearing loss illustratively includes a master headphone unit **30** that, in turn, includes a master housing **31** independently carried behind an ear **38** of the user. The master housing **31** is a behind the ear (BTE) housing and is arcuate in shape. The master housing **31** fits over the root of the helix of the user's ear, as will be appreciated by those skilled in the art. The master housing **31** may be another type of housing, for example, an in-the-canal housing.

[0039] Master circuitry **32** is carried by the master housing **31**. The master circuitry includes a stereo audio source **33** and a wireless transmitter **34** coupled thereto. The stereo audio source **33** may be a memory, for example, and may store stereo audio data. The memory may be fixed or may be removable, for example, a secure digital (SD) memory card. Other types of memory, may be used.

[0040] The stereo audio data that may be stored in a memory or provided by the stereo audio source may be mpeg layer 3 (mp3) encoded data, for example. Other types of stereo audio data or other data may be stored in the memory.

[0041] The stereo audio source **33** may be a stereo audio wireless receiver. For example, the stereo audio wireless receiver may be a frequency modulation (FM) stereo receiver and may transmit stereo FM radio. The stereo audio wireless receiver may also be a satellite receiver for receiving a stereo audio satellite

transmission. Still further, the stereo audio wireless receiver may be a Bluetooth or wireless local area network (WLAN) receiver to wirelessly receive stereo audio therefrom, for example, as may be transmitted from a mobile wireless communications device (i.e. cellular telephone), or over an Internet transmission. The stereo audio wireless receiver may be another type of wireless receiver, a combination of wireless receivers, and the stereo audio source 33 may be a combination of a stereo audio wireless receiver and/or memory to provide stereo audio from more than one stereo audio source.

[0042] The master headphone unit 30 also includes a master audio output device 36 carried by the master housing 31. The master audio output device 36 is coupled to the master circuitry 32 for playing a first stereo audio channel. The master audio output device 36 may be a master electrical-to-acoustical (E/A) transducer 46 (i.e. speaker). The master audio output device 36 and the portion of the master housing 31 carrying the master output device are adjacent the user's ear canal, i.e. the opening of the user's ear (FIG. 1). A master amplifier 44 may cooperate with the stereo audio source 33 to amplify the first stereo audio channel for playback via the master audio output device.

[0043] Input devices 37 are illustratively carried by the master housing 31. The input devices 37 may be push buttons and may be coupled to the master circuitry 32. The input devices 37 may be for adjusting volume, and stereo audio source selection. For example, if the stereo audio source is a memory having stereo audio (music) stored thereon, a selected one of the input

devices 37 may be for skipping to another song, or fast-forwarding through a song. Other types of input devices may be used and may correspond to different command and/or function, as will be appreciated by those skilled in the art.

[0044] The master headphone unit 30 also includes a master rechargeable power supply 41 coupled to the master circuitry 32 for providing power thereto. The master rechargeable power supply may be a rechargeable battery, for example, a nickel-cadmium (NiCad) or lithium ion (Li-ion) rechargeable battery. Other types of rechargeable power supplies may be used, as will be appreciated by those skilled in the art.

[0045] The wireless transmitter 34 of the master circuitry 32 may operate in any one of different frequency ranges, for example, 2.4 GHz or 5.8 GHz, similar to cordless phones. The wireless transmitter may be a digital wireless transmitter, or an analog wireless transmitter. The wireless transmitter 34 cooperates with the stereo audio source 33 to transmit a second stereo audio channel to a slave headphone unit 60.

[0046] The slave headphone unit 60 illustratively includes a slave housing 61. The slave housing 61 is illustratively similar to the master housing 31 in size and shape, but the slave housing is configured to be independently carried behind another ear 68 of the user.

[0047] Slave circuitry 62 is also carried by the slave housing 61 and includes a slave wireless receiver 63 cooperating with the wireless transmitter 34. The slave wireless receiver 63 is configured to receive stereo audio, or the second stereo audio channel

transmitted from the wireless transmitter **34**, and is configured at an operating frequency corresponding to the wireless transmitter.

[0048] The slave headphone unit **60** also includes a slave audio output device **64**. The slave audio output device **64** is carried by the slave housing **61** and coupled to the slave circuitry **62** for playing the second stereo audio channel. As will be appreciated by those skilled in the art, the slave housing **61**, and the slave audio output device **64** may be similar to the corresponding elements in the master headphone unit **30**. For example, the slave audio output device **64** may also be an E/A transducer **76** that is positioned adjacent another ear canal of the user's other ear. Additional components present in the master headphone unit **30** may also be present in the slave headphone unit **60**, for example, a slave rechargeable power supply **71**, and slave input devices **67**. A slave amplifier **74** may also cooperate with the stereo audio received by the slave wireless receiver **63** to amplify it for playback via the slave audio output device **64**.

[0049] The master circuitry **32** also includes first and second independently settable frequency equalizers **42**, **43** for the first and second stereo channels to permit independent selection of frequency equalization to compensate for the hearing loss of the user. For example, the frequency equalization of a plurality of frequency bands could be independently selected according to a user's hearing loss parameters, as may be determined by an audiogram, for example. The first and second independently settable frequency equalizers **42**, **43** are illustratively both carried by the master housing **31**.

[0050] Alternatively or additionally, the frequency equalization may also be independently selected according to a user's personal acoustical preferences. Still further, alternatively or additionally, the frequency equalization may be independently selected for stereo audio fluctuation based upon a type of ear fitting, as will be described in further detail below.

[0051] In some embodiments, for example, five to six bands of frequency equalization may be independently selected to accommodate hearing loss, and may also further accommodate personal acoustical preferences, and stereo audio fluctuation. Of course, any number of bands of frequency equalization may be independently selected to accommodate hearing loss. Independent selection of frequency equalization may include independently or selectively amplifying or attenuating a number of frequency bands.

[0052] For example, where five bands of frequency equalization are to be independently selected, each frequency band may be equally divided and may be 3996 Hz wide from 20 Hz - 20 kHz, the audible spectrum. In some embodiments, the frequency bands may be divided unequally. For example, the audible spectrum may be divided into bands from 20 Hz - 3 kHz, 3-4 kHz, 4-5 kHz, 5-8 kHz, and 8-20 kHz. As will be appreciated by those skilled in the art, a user's hearing is less sensitive to frequencies above 8 kHz and more sensitive to frequencies between 2-5 kHz, so it may be particularly advantageous to include smaller bands for independent selection frequency equalization in the 2-5 kHz range. Of course, each of the frequency bands may include any range of frequencies and be from any portion of the audible spectrum.

[0053] As will be appreciated by a person skilled in the art, a user may have 30 to 40 dB of hearing loss across different portions of the audible spectrum, 20 Hz - 20 kHz. A user with normal hearing may desire stereo audio, for example stereo music, at 75 to 85 dB. The hearing impaired user may add 30 dB to 40 dB of additional gain by independently selecting the frequency equalization to 75 dB to 85 dB across selected frequency bands to compensate for hearing loss. An overall output, for the user with hearing loss, of about 125 dB may be produced. In some instances, it may be possible to have an overall output of 135 dB to 140 dB based upon a type of ear fitting 45.

[0054] Referring now additionally to the graphs 90, 95 in FIGS. 5a and 5b, respectively, independent hearing thresholds across different frequencies for a user's left and right ears are illustrated. A user's left ear measured hearing threshold 92 illustratively decreases from a normal threshold level as frequencies. As will be appreciated by those skilled in the art, a normal hearing level ranges from 0 to 25 dB, for example. Similarly, a user's right ear measured hearing threshold 97, also illustratively decreases from a normal threshold level as frequencies.

[0055] To compensate for the user's hearing loss, the frequency equalization at different frequencies may be independently selected to a desired level 93, 96. For example, for a desired equalization level of 20 dB for the user's left ear, an attenuation of 15 dB of the band including 250 Hz, and a gain of about 80 dB of the band including 8 kHz would be needed. Additionally, for example, for a desired equalization level or

hearing threshold level of 20 dB for the user's right ear, an attenuation of 10 dB of the band including 250 Hz, and a gain of about 75 dB of the band including 8 kHz would be needed. As will be appreciated by those skilled in the art, attenuating selected frequency bands may reduce distortion when the overall volume or gain across all frequencies is increased. Of course, other desired hearing threshold levels may be used, and the frequencies extending through the audible spectrum may be measured and independently equalized.

[0056] Referring now additionally to the graphs **90**, **95** in FIGS. 5a and 5b, respectively, independent hearing thresholds across different frequencies for a user's left and right ears are illustrated. A user's left ear measured hearing threshold **92** illustratively decreases from a normal threshold level as frequencies. As will be appreciated by those skilled in the art, a normal hearing level ranges from 0 to 25 dB, for example. Similarly, a user's right ear measured hearing threshold **97**, also illustratively decreases from a normal threshold level as frequencies.

[0057] To compensate for the user's hearing loss, the frequency equalization at different frequencies may be independently selected to a desired level **93**, **96**. For example, for a desired equalization level of 20 dB for the user's left ear, an attenuation of 15 dB of the band including 250 Hz, and a gain of about 80 dB of the band including 8 kHz would be needed. Additionally, for example, for a desired equalization level or hearing threshold level of 20 dB for the user's right ear, an attenuation of 10 dB of the band including 250 Hz, and a gain of about 75 dB of the band including 8 kHz would be needed. As will be appreciated by those

skilled in the art, attenuating selected frequency bands may reduce distortion when the overall volume or gain across all frequencies is increased. Of course, other desired hearing threshold levels may be used, and the frequencies extending through the audible spectrum may be measured and independently equalized.

[0058] The stereo audio headphone apparatus **20** illustratively includes a remote control unit **51** that is operatively coupled to the master headphone unit **30** (FIG. 1). The remote control unit **51** illustratively communicates with a master wireless receiver **35**. Alternatively, the remote control unit **51** may communicate with the stereo audio source **33** when it is configured as a stereo audio wireless receiver of the stereo audio source. The remote control unit **51** may also communicate with the slave wireless receiver **63**, or a second slave wireless receiver (not shown).

[0059] The remote control unit **51** may be a radio frequency (RF) remote control unit, or in some embodiments, the remote control unit may be an infrared (IR) remote control unit. Additionally, the remote control unit **51** may not be wireless and may be wired to either or both the master and slave headphone units **30**, **60**.

[0060] The remote control unit **51** is configured to transmit commands, for example, to the master wireless receiver **35**. Commands that may be transmitted include volume, and stereo audio source selection. For example, if the stereo audio source **33** is a memory having music stored thereon, the remote controller **43** may send commands for skipping to another song, or fast-forwarding through a song. The remote control unit **43** may also send commands relating to the

independent selection of the frequency equalization for the first and second stereo audio channels.

[0061] The remote control unit 51 also illustratively includes remote control unit input devices 52, for example, push buttons, that correspond to the commands. The remote control unit 51 also includes a display 53 that may display information about the stereo audio source 33, for example, a song title or artist, or information about the stereo audio headphones, for example, volume and/or battery power remaining. The remote control unit 51 may advantageously send commands corresponding to ones of the input devices 37. Of course, the remote control unit 51 may send other commands and may display other information.

[0062] Referring now additionally to FIG. 6, the stereo audio headphone apparatus 20 also includes a recharging station 81 configured to receive the master and slave headphone units 30, 60 for recharging the master and slave rechargeable power supplies 41, 71, respectively. The recharging station 81 includes a power source connector 83 for coupling to a power supply, for example, an electrical wall outlet.

[0063] Illustratively, the recharging station 81 includes a pair of recharging station headphone unit connectors 82a, 82b for coupling to respective master and slave headphone unit recharging station ports 47, 67. The master and slave headphone unit recharging station ports 47, 67 are carried by their respective housings 31, 61. More particularly, the master and slave headphone unit recharging station ports 47, 67 are illustratively recessed within their respective housings 31, 61. This advantageously reduces the

overall size of each housing **31**, **61** and may also reduce snagging for example, as opposed to a connector extending from the housing. Thus, a user's comfort is also increased.

[0064] The recharging station **81** includes a recharging station data connector **82** for coupling to a personal computer **85**, for example. Of course, the computer may be a portable computer, or other type of communications device, for example, a mobile wireless communications device. The recharging station data connector **84** may be a universal serial bus (USB) connector, and connect to a USB port of the personal computer **85**, for example. Other types of connectors or data buses may be used.

[0065] Data communicated via the recharging station data connector **84** may be sent to and stored in the stereo audio headphone units **30**, **60** from the personal computer **85** when the stereo headphone units are coupled to the recharging station **81**. More particularly, the first and second independently settable frequency equalizers **42**, **43** for the first and second stereo channels may be set to compensate for the user's hearing loss via the personal computer **85**. Other data, for example, stereo audio data or data related thereto, may be loaded to the stereo audio source **33**.

[0066] Additionally, in the case of a USB data bus or cable, the power source connector **83** may not be needed, as charging may also be performed over the recharging station data connector **84**. Where the recharging station **81**, including the master and slave stereo headphone units **30**, **60** coupled thereto, are coupled to a personal computer **85**, for example, a computer program stored on a computer-readable medium

may be used to load the data. The computer-readable medium may include a physical drive or memory, as will be appreciated by those skilled in the art.

[0067] Referring now additionally to FIGS. 7-8, the master audio output device **36** may also include a master ear fitting **45** coupled to the master E/A transducer **46** adjacent the user's ear canal **55**. The master ear fitting **45** may be removably coupled to the master E/A transducer **37** for placement inside the ear canal **55** of the user. As will be appreciated by those skilled in the art, the removable master ear fitting **45** may be one of a plurality of interchangeable removable ear fittings. A different removable master ear fitting may be desired for different applications, for example, exercise and a helmet-requiring activity, and based upon the sound level of the environment, for example, a gym, or noisy activity.

[0068] The master ear fitting **45** may be formed of a deformable elastomer. The master ear fitting **45** is flexible so that as a user talks or chews, the master ear fitting will flex with the user's mandible and with the movement of the external portion of the user's ear canal. The master ear fitting **45** may be formed of another material, as will be appreciated by those skilled in the art.

[0069] Referring now more particularly to the master ear fitting **45** in FIG. 8a, the master ear fitting illustratively has an elongate shape for extending further into the ear canal of a user **55**. The elongate shape of the master ear fitting **45** advantageously reduces reflection of sound caused by the ear canal **55** and improves sound quality at lower frequencies. The master ear fitting **45** may extend about 2-3 mm into the

ear canal of a user **55** and may be particularly advantageous for a user with more severe hearing loss. Because the master ear fitting **45**, which fits at the first bend of the ear canal of the user is closer to the eardrum, less amplification may be needed for a user with hearing loss.

[0070] Referring now more particularly to the master ear fitting **45'** in FIG. 8b, the master ear fitting is illustratively partially vented via an opening formed therein. The partial ventilation is particularly advantageous for a physically active user, for example. The ventilation allows air to penetrate the ear canal **55**, which helps prevent moisture build-up. As will be appreciated by those skilled in the art, moisture build-up may reduce the quality and degrade the stereo audio, as well as provide discomfort for the user. In the case of a physically active user having a hearing loss, additional compensation for the hearing loss based upon moisture build-up may be not be needed. Additional openings may be provided and/or may be oriented differently as will be appreciated by those skilled in the art. In some instances, venting may be accomplished by configuring the master ear fitting **37** to be configured to have a diameter less than a diameter of the user's ear canal **55**.

[0071] Referring now more particularly to the master ear fitting **45''** in Fig 8c, the master ear fitting is illustratively frusto-conical in shape and may be particularly useful for loud environments or while riding a motorized vehicle. The frusto-conical shape advantageously reduces external noises. Indeed, a user may listen to the stereo audio without having to increase the volume or in an effort to drown out the

external or background noise. In the case of a user that suffers from hearing loss, this may reduce additional compensation for the hearing loss based upon the environmental noise. Of course, other ear fittings may be used, for example, an ear fitting may be formed for a user's ear based upon the amount of hearing loss and desired activities.

[0072] The slave audio output device **64** also includes a slave ear fitting **75**. The slave ear fitting is similar to the master ear fitting, and is coupled to the slave E/A transducer **76**. As will be appreciated by those skilled in the art, while different embodiments of the master ear fitting **45** have been described above, the different embodiments of the master ear fitting are also applicable to the slave ear fitting for coupling to the slave E/A transducer **76**.

[0073] Referring now to FIG. 9, in another embodiment, the master headphone unit **30'** may also include a master audio input device **48'**, for example, an audio input transducer or microphone, carried by the master housing **31'**. The master circuitry **32'** is also operable in a pass-through mode with the audio sensed by the master audio input device **48'** being delivered to the master audio output device **36'** via the first independently settable equalizer **42'**. The first independently settable equalizer **42'** is illustratively carried by the master housing **31'**. In other words, in the pass-through mode, the master headphone unit **30'** functions similar to a hearing aid.

[0074] The master circuitry **32'** is also operable in an impulse noise rejecting pass-through mode. More particularly, the master circuitry may include an independent master audio impulse detector **49'** to permit

independent selection of frequency equalization, or audio volume, for a detected audio impulse detected from the master audio input device 48'. For example, an audio impulse may include a backfire from a vehicle, a gunshot, or other impulse noise. The independent master audio impulse detector 49' advantageously can compress a loud audio impulse in a relatively small time period, for example, a few milliseconds. For example, in the case of a gunshot, the associated audio impulse may be independently compressed to a reduced sound level.

[0075] As will be appreciated by those skilled in the art, independent audio impulse detection advantageously reduces further hearing loss to a user that has hearing loss, or may reduce the chances of developing hearing loss in a user that may not have hearing loss.

[0076] Still further, in the case where a user tilts their head toward their shoulder to fire a gun, the ear adjacent the user's shoulder may be more protected than the user's other ear, and thus may require less audio volume compensation or audio volume attenuation.

Independent audio volume compensation or attenuation based upon a detected impulse advantageously allows for audio volume compensation or attenuation for each ear independently, for example. Moreover, the advantages of the independent audio impulse detection combined with the independent selection of frequency equalization to compensate for hearing loss of a user may provide an appropriate or desired compensation level for the hearing impaired user, as compared to prior art stereo audio headphones.

[0077] Of course, the master circuitry 32' may be

selectively operated to provide one or a combination of the independent selection of frequency equalization of stereo audio data provided by the stereo audio source 33', independent selection of frequency equalization based upon a detected audio impulse, and independent selection of frequency equalization of the audio sensed by the master audio input device 48'.

[0078] The slave headphone unit 60' may also include a slave audio input device 78', for example, an audio input transducer or microphone, carried by the slave housing 61'. Similar to the master circuitry 32', the slave circuitry 62' is also operable in a pass-through mode with the audio sensed by the slave audio input device 78' being delivered to the slave audio output device 64' via the second independently settable equalizer 43'. The second independently settable equalizer 43' is carried by the slave housing 61'. The slave circuitry 62' may also include a slave audio impulse detector 79' and may also be operable in an impulse noise rejecting pass-through mode to reject impulse noise. Of course, the slave circuitry 62' may also be operated in conjunction with the master circuitry 32' to be operated in any or a combination of modes.

[0079] Moreover, in this embodiment, since the second equalizer 43' is carried by the slave housing 62', the wireless transmitter 34' may also transmit commands relating to the independent selection of the frequency equalization for the second stereo audio channel to compensate for hearing loss of a user. The stereo audio from the stereo audio source 33' may also be sent in addition to the commands relating to the independent selection of the frequency equalization.

Other commands, such as those relating to the operation mode of the slave circuitry, for example, may also be sent.

[0080] Referring now to FIGS. 10-11, another embodiment of the stereo audio headphone apparatus for a user having hearing loss is illustrated. Illustratively, the master headphone unit **130** includes a master housing **131** that does not extend to the opening of the user's ear canal. Instead, the master housing **131** ends at the front of the user's ear, or the root of the helix of the user's ear, as will be appreciated by those skilled in the art.

[0081] The master audio output device **136** includes a master E/A transducer **146** and a master audio delivery tube **121**. The master audio delivery tube **121** illustratively has a proximal end **122** coupled to the master E/A transducer **146**, and a distal end **123** positioned adjacent the ear canal of the user. The master audio delivery tube **121** is illustratively round in shape. However, the master audio delivery tube **121** is not limited to a round shape. Other sizes and shapes of stereo audio carrying tubes may be used, and may depend on the extent and type of the user's hearing loss and desired application.

[0082] The master audio delivery tube **121** advantageously increases comfort to the user by allowing the use of a master ear fitting **145** that is smaller than the ear canal of the user to be used. Additionally, the master audio delivery tube **121** and corresponding master ear fitting **145** may also provide increased comfort in certain activities, for example, activities using a helmet. Indeed, the pressing of the hard plastic of the master housing **131** is reduced in

the area in front of the ear. Additionally, using the master audio delivery tube **121** reduces the overall weight of the master headphone unit **130**, and thus may reduce the overall cost of manufacture.

[0083] The master audio delivery tube **121** is selectively extendable from adjacent portions of the master housing **131** (FIG. 10). More particularly, the master housing **131** illustratively has an opening formed therein to allow the master audio delivery tube **121** to slidably adjust to accommodate different sizes of a user's ear. In other words, the master audio delivery tube **121** is extendable for positioning within the opening of the ear canal, for example, adjacent the miadis. As will be appreciated, the proper fitment may provide additional compensation for a user having a hearing loss.

[0084] A master ear fitting **145** is coupled to the distal end **123** of the master audio delivery tube **121**. The master ear fitting **145** is illustratively sized to fit within the ear canal of the user and includes a plurality of openings therein for ventilation.

[0085] Similar to the master audio output device **136**, the slave audio output device (not shown) also includes a slave E/A transducer (not shown) and a slave audio delivery tube (not shown) having a proximal end coupled to the slave E/A transducer and a distal end to be positioned adjacent another ear canal of the user.

[0086] Referring now to FIG. 12, in another embodiment the master ear fitting **145'** has a curved shape and is positioned near the top of the user's ear canal. The master ear fitting **145'** does not entirely fill the user's ear canal to provide the ventilation. Of course, with any of the embodiments described

herein, other ear fittings may be used, for example, as described above with reference to FIGS. 7-8.

[0087] A biasing clip **124'** may be optionally coupled to the distal end **123'** of the master audio delivery tube **121'** and may sit in the conchal bowl of the user's ear, (i.e. the bottom of the opening of the user's ear) to improve security and fitment. The biasing clip **124'** may be desirable for a user having a hearing loss that participates in impact sports or activities. As will be appreciated by those skilled in the art, the slave headphone unit (not shown) may be similarly configured.

[0088] Referring now to FIG 13, in another embodiment, the proximal end **122''** of the master audio delivery tube **121''** is removably coupled to the master E/A transducer **146''**. More particularly, the master audio delivery tube **121''** is coupled to an external master audio delivery tube coupling port **125''**. The external master audio delivery tube coupling port **125''** may include a circumferential protrusion **126''** for coupling to a corresponding circumferential cut **127''** in the master audio delivery tube **121''**. As will be appreciated by those skilled in the art, different sized master audio delivery tubes may be used, both in length and diameter. Still further, other types of coupling arrangements between the master audio delivery tube **121''** and the master E/A transducer **146''** may be used. The slave headphone unit (not shown) may be configured similarly to the master headphone unit **130''**.

[0089] A method aspect is directed to a method for compensating for hearing loss of a user. The method includes providing a master headphone unit **30** that includes a master housing **31** to be independently

carried behind an ear **38** of the user and master circuitry **32** carried by the master housing. The master circuitry **32** includes a stereo audio source **33** and a wireless transmitter **34** coupled thereto. A master audio output device **36** is carried by the master housing **31** and coupled to the master circuitry **32** for playing a first stereo audio channel from the stereo audio source **33**.

[0090] The method also includes providing a slave headphone unit **60** that includes a slave housing **61** to be independently carried behind another ear **68** of the user, and slave circuitry **62** carried by slave housing. The slave circuitry **62** includes a wireless receiver **63** cooperating with the wireless transmitter **34** and a slave audio output device **64** carried by the slave housing **61** and coupled to the slave circuitry for playing a second stereo audio channel from the stereo audio source.

[0091] The method further includes independently setting first and second independently settable frequency equalizers **42**, **43** for the first and second stereo audio channels to compensate for the hearing loss of the user.

[0092] The stereo audio headphone apparatus **20** may be particularly advantageous to a user having hearing loss that may wish to listen to music, for example, by permitting independent selection of frequency equalization. In other words, a user having hearing loss may be able to portably enjoy a full spectrum of stereo audio (i.e. music) by individually adjusting the stereo audio for their hearing loss and/or desired acoustical preferences.

[0093] Moreover, the stereo audio headphone units

30, 60 advantageously are wireless and have a relatively low profile behind the ear. This increases user comfort in wearing the stereo audio headphones, and may be particularly advantageous in activities involving wearing of a helmet and in activities involving a range of body movements, for example. More particularly, the wireless operation of the stereo audio headphones may be particularly useful during a workout or during a run, for example, on a treadmill. As will be appreciated by those skilled in the art, interference with movement, from wires, for example, is reduced.

[0094] Even still further, in some embodiments, the stereo audio headphone apparatus 20 advantageously may reduce noise that may be potentially damaging to a user's ear, for example, an impulse noise. Reducing an impulse noise may protect a user that does not have hearing loss from developing a hearing loss from the impulse noise, either temporary or permanent, while protecting against further hearing loss from the impulse noise in a user that has a hearing loss.

[0095] The advantages of the stereo audio headphones, along with the pass-through mode and with the desired fitment of the ear fitting further provide increased hearing loss compensation of stereo audio for a desired application. Thus, the stereo audio headphone apparatus 20 may improve the overall listening experience of a user. Indeed, while the stereo audio headphone apparatus 20 may be beneficial to any user, the stereo audio headphones may be particularly beneficial to a user having hearing loss.

[0096] It is noted that in different embodiments, certain elements are described with regard to the

master headphone unit **30**. While these elements may not have been specifically described with regard to the slave headphone unit **60**, as will be understood by those skilled in the art, the elements that are present in the master headphone unit **30** may also present in the slave headphone unit, for example, an input device, an audio input device, a power source, a recharging station port, and an independent audio impulse detector. The operation of these elements is similar to the corresponding ones in the master headphone unit **30**, as will be appreciated by those skilled in the art.

[0097] Many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is understood that the invention is not to be limited to the specific embodiments disclosed, and that modifications and embodiments are intended to be included within the scope of the appended claims.

THAT WHICH IS CLAIMED IS:

1. A stereo audio headphone apparatus for a user having hearing loss and comprising:

a master headphone unit comprising

a master housing to be independently carried behind an ear of the user,

master circuitry carried by said master housing and comprising a stereo audio source and a wireless transmitter coupled thereto, and

a master audio output device carried by said master housing and coupled to said master circuitry for playing a first stereo audio channel from said stereo audio source;

a slave headphone unit comprising

a slave housing to be independently carried behind another ear of the user,

slave circuitry carried by said slave housing and comprising a wireless receiver cooperating with said wireless transmitter, and

a slave audio output device carried by said slave housing and coupled to said slave circuitry for playing a second stereo audio channel from said stereo audio source; and

first and second independently settable frequency equalizers for the first and second stereo audio channels to permit independent selection of frequency equalization to compensate for the hearing loss of the user.

2. The stereo audio headphone apparatus according to Claim 1, wherein said first independently settable equalizer is carried by said master housing;

and wherein said second independently settable equalizer is carried by said slave housing.

3. The stereo audio headphone apparatus according to Claim 2, wherein said master headphone unit further comprises a master audio input device carried by said master housing and coupled to said master circuitry; and wherein said master circuitry is operable in a pass-through mode with audio sensed by said master audio input device being delivered to said master audio output device via said first independently settable equalizer.

4. The stereo audio headphone apparatus according to Claim 3, wherein said slave headphone unit further comprises a slave audio input device carried by said slave housing and coupled to said slave circuitry; and wherein said slave circuitry is also operable in the pass-through mode with audio sensed by said slave audio input device being delivered to said slave audio output device via said second independently settable equalizer.

5. The stereo audio headphone apparatus according to Claim 4, wherein said master circuitry is operable in an impulse noise rejecting pass-through mode to reject impulse noise; and wherein said slave circuitry is also operable in the impulse noise rejecting pass-through mode.

6. The stereo audio headphone apparatus according to Claim 1, wherein said first and second independently settable equalizers are carried by said

master housing.

7. The stereo audio headphone apparatus according to Claim 1, wherein said master audio output device comprises a master electrical-to-acoustical (E/A) transducer, and a master audio delivery tube having a proximal end coupled to said master E/A transducer and a distal end to be positioned adjacent an ear canal of the user; and wherein said slave audio output device comprises a slave E/A transducer, and a slave audio delivery tube having a proximal end coupled to said slave E/A transducer and a distal end to be positioned adjacent another ear canal of the user.

8. The stereo audio headphone apparatus according to Claim 7, wherein said master audio output device further comprises a master ear fitting coupled to the distal end of said master audio delivery tube; and wherein said slave audio output device further comprises a slave ear fitting coupled to the distal end of said slave audio delivery tube.

9. The stereo audio headphone apparatus according to Claim 7, wherein said master audio delivery tube is selectively extendible from adjacent portions of said master housing; and wherein said slave audio delivery tube is selectively extendible from adjacent portions of said slave housing.

10. The stereo audio headphone apparatus according to Claim 1, wherein said master audio output device comprises a master electrical-to-acoustical (E/A) transducer to be positioned adjacent an ear canal

of the user; and wherein said slave audio output device comprises a slave E/A transducer to be positioned adjacent another ear canal of the user.

11. The stereo audio headphone apparatus according to Claim 10, wherein said master audio output device further comprises a master ear fitting coupled to said master E/A transducer; and wherein said slave audio output device further comprises a slave ear fitting coupled to said slave E/A transducer.

12. The stereo audio headphone apparatus according to Claim 1, wherein said master housing has an arcuate shape; and wherein said slave housing also has an arcuate shape.

13. The stereo audio headphone apparatus according to Claim 1, further comprising a remote control unit operatively coupled to at least one of said master and slave headphone units.

14. The stereo audio headphone apparatus according to Claim 1, wherein said master headphone unit comprises a master rechargeable power supply coupled to said master circuitry; wherein said slave headphone further comprises a slave rechargeable power supply coupled to said slave circuitry; and further comprising a recharging station to receive said master and slave headphone units for recharging said master and slave rechargeable power supplies, respectively.

15. A stereo audio headphone apparatus for a user having hearing loss and comprising:

a master headphone unit comprising
a master arcuate housing to be
independently carried behind an ear of the user,
master circuitry carried by said master
housing and comprising a stereo audio source and a
wireless transmitter coupled thereto, and
a master audio output device carried by
said master housing and coupled to said master
circuitry for playing a first stereo audio channel
from said stereo audio source;
a slave headphone unit comprising
a slave arcuate housing to be
independently carried behind another ear of the
user,
slave circuitry carried by said slave
housing and comprising a wireless receiver
cooperating with said wireless transmitter, and
a slave audio output device carried by
said slave housing and coupled to said slave
circuitry for playing a second stereo audio
channel from said stereo audio source; and
first and second independently settable
frequency equalizers carried by said master housing and
for the first and second stereo audio channels to
permit independent selection of frequency equalization
to compensate for the hearing loss of the user

16. The stereo audio headphone apparatus
according to Claim 15, wherein said master audio output
device comprises a master electrical-to-acoustical
(E/A) transducer, and a master audio delivery tube
having a proximal end coupled to said master E/A
transducer and a distal end to be positioned adjacent

an ear canal of the user; and wherein said slave audio output device comprises a slave E/A transducer, and a slave audio delivery tube having a proximal end coupled to said slave E/A transducer and a distal end to be positioned adjacent another ear canal of the user.

17. The stereo audio headphone apparatus according to Claim 16, wherein said master audio output device further comprises a master ear fitting coupled to the distal end of said master audio delivery tube; and wherein said slave audio output device further comprises a slave ear fitting coupled to the distal end of said slave audio delivery tube.

18. The stereo audio headphone apparatus according to Claim 16, wherein said master audio delivery tube is selectively extendible from adjacent portions of said master housing; and wherein said slave audio delivery tube is selectively extendible from adjacent portions of said slave housing.

19. The stereo audio headphone apparatus according to Claim 16, wherein said master audio output device comprises a master electrical-to-acoustical (E/A) transducer to be positioned adjacent an ear canal of the user; and wherein said slave audio output device comprises a slave E/A transducer to be positioned adjacent another ear canal of the user.

20. The stereo audio headphone apparatus according to Claim 19, wherein said master audio output device further comprises a master ear fitting coupled to said master E/A transducer; and wherein said slave

audio output device further comprises a slave ear fitting coupled to said slave E/A transducer.

21. A method for compensating for hearing loss of a user comprising:

providing a master headphone unit comprising a master housing to be independently carried behind an ear of the user, master circuitry carried by the master housing and comprising a stereo audio source and a wireless transmitter coupled thereto, and a master audio output device carried by the master housing and coupled to the master circuitry for playing a first stereo audio channel from the stereo audio source;

providing a slave headphone unit comprising a slave housing to be independently carried behind another ear of the user, slave circuitry carried by slave housing and comprising a wireless receiver cooperating with the wireless transmitter, and a slave audio output device carried by the slave housing and coupled to the slave circuitry for playing a second stereo audio channel from the stereo audio source; and

independently setting first and second independently settable frequency equalizers for the first and second stereo audio channels to compensate for the hearing loss of the user.

22. The method according to Claim 21, wherein the first independently settable equalizer is carried by the master housing; and wherein the second independently settable equalizer is carried by the slave housing.

23. The method according to Claim 22,

wherein providing the master headphone unit comprises providing the master headphone unit comprising a master audio input device carried by the master housing and coupled to the master circuitry; and wherein the method further comprises configuring the master circuitry to be operable in a pass-through mode with audio sensed by the master audio input device being delivered to the master audio output device via the first independently settable equalizer.

24. The method according to Claim 23, wherein providing the slave headphone unit comprises providing the slave headphone unit comprising a slave audio input device carried by the slave housing and coupled to the slave circuitry; and wherein the method further comprises configuring the slave circuitry to also be operable in the pass-through mode with audio sensed by the slave audio input device being delivered to the slave audio output device via the second independently settable equalizer.

25. The method according to Claim 23, further comprising configuring the master circuitry to be operable in an impulse noise rejecting pass-through mode to reject impulse noise; and further comprising configuring the slave circuitry to also be operable in the impulse noise rejecting pass-through mode.

**STEREO AUDIO HEADPHONE APPARATUS FOR A USER
HAVING A HEARING LOSS AND RELATED METHODS**

Abstract of the Disclosure

A stereo audio headphone set may include a master headphone unit including a master housing to be independently carried behind an ear of the user, master circuitry including a stereo audio source and a wireless transmitter coupled thereto, and a master audio output device coupled to the master circuitry for playing a first stereo audio channel from the stereo audio source. A slave headphone unit may include a slave housing to be independently carried behind another ear of the user, slave circuitry including a wireless receiver cooperating with the wireless transmitter, and a slave audio output device coupled to the slave circuitry for playing a second stereo audio channel from the stereo audio source. First and second independently settable frequency equalizers may also be included for the first and second stereo audio channels to permit independent selection of frequency equalization to compensate for hearing loss.

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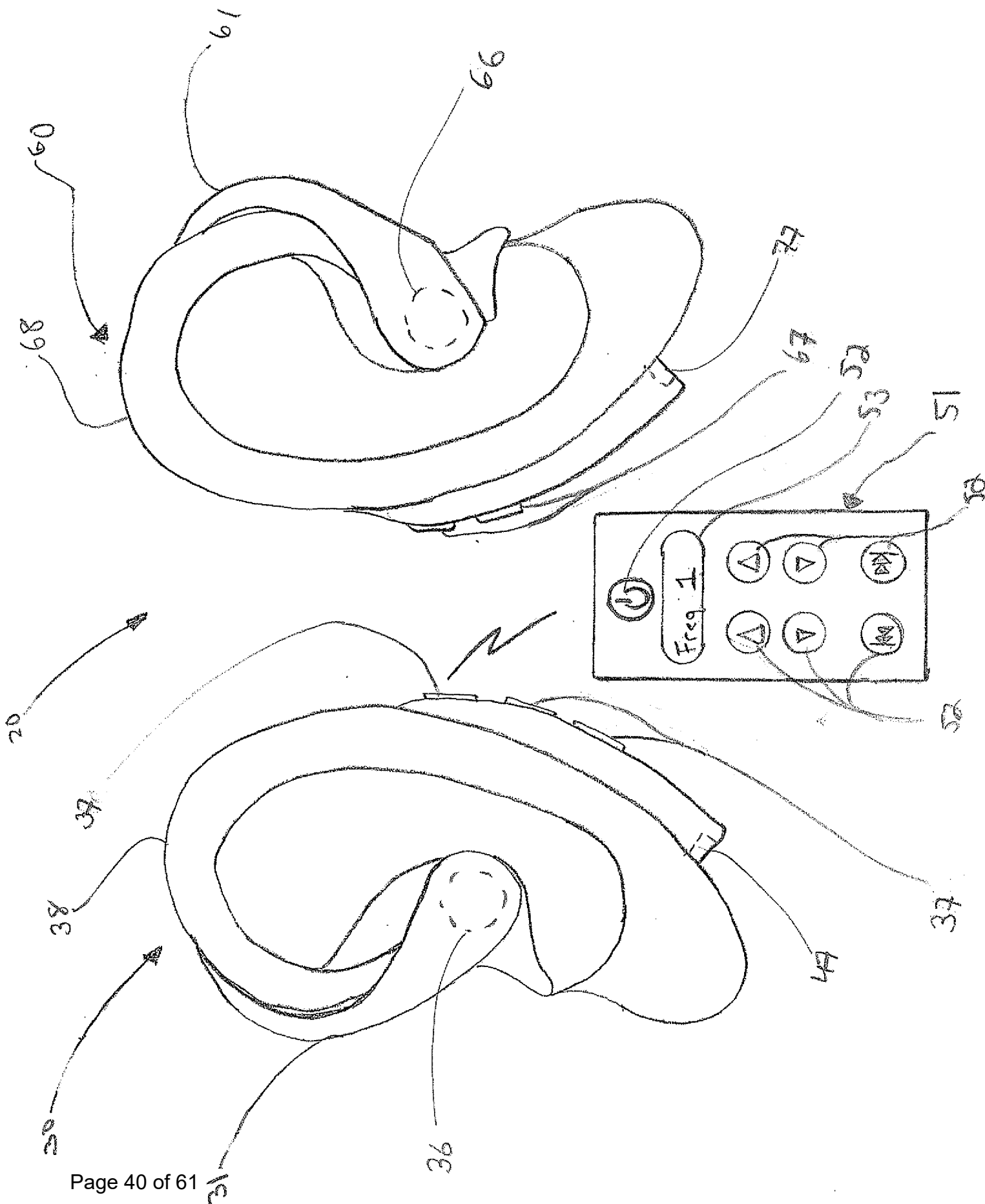
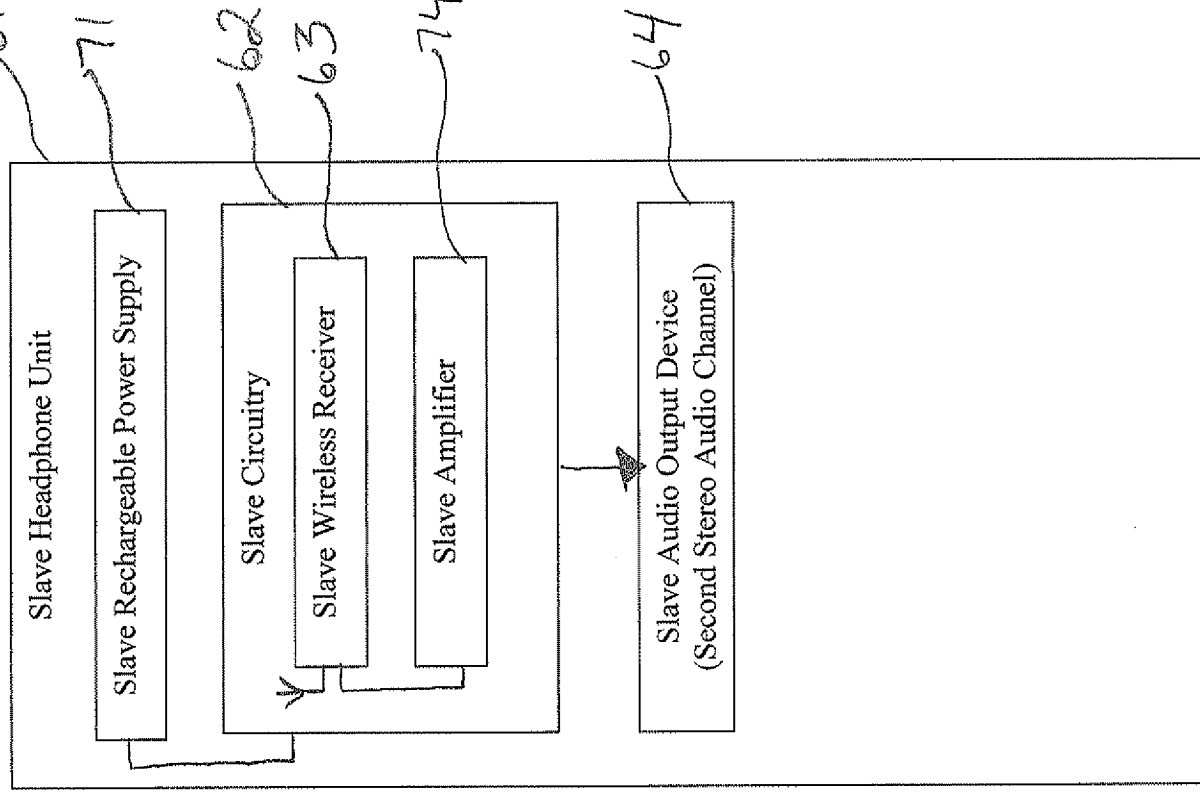
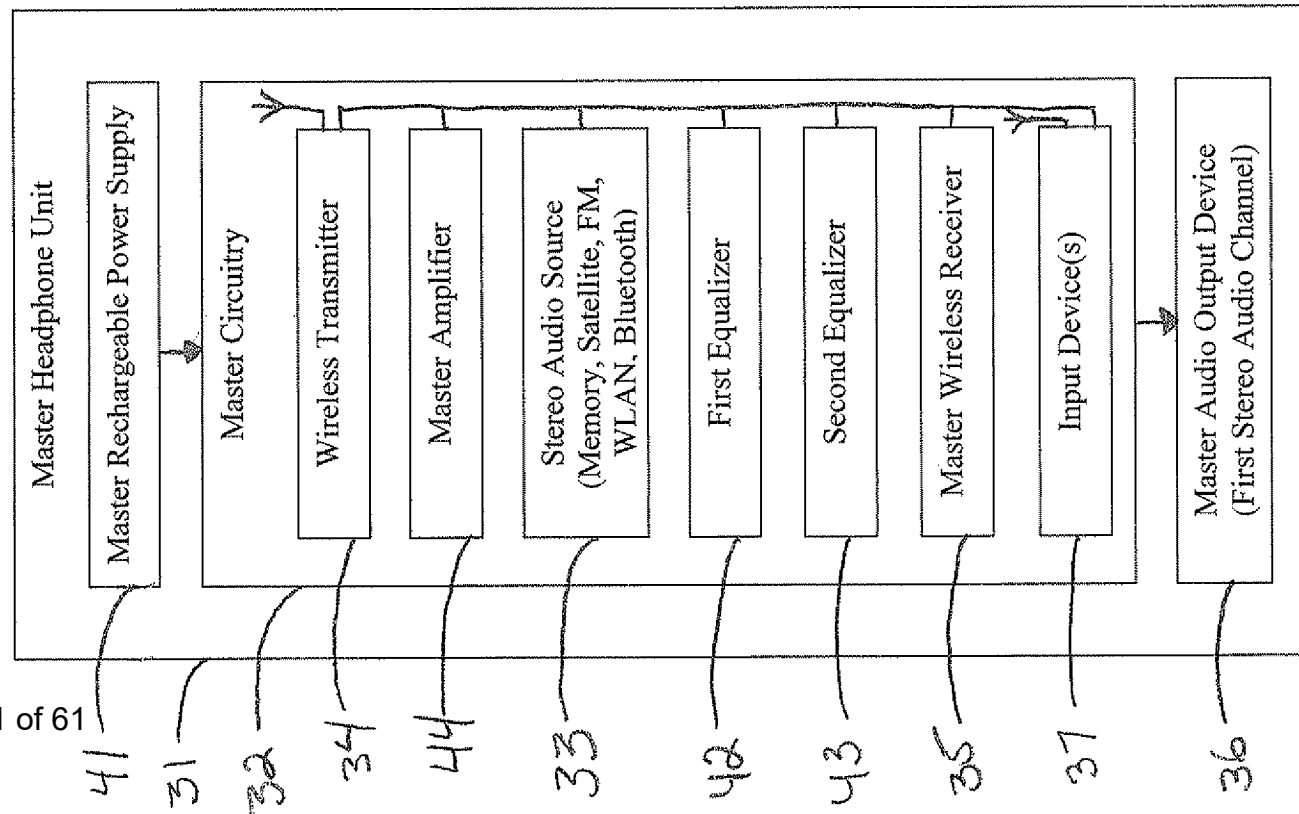


Fig. 1

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Fig. 2



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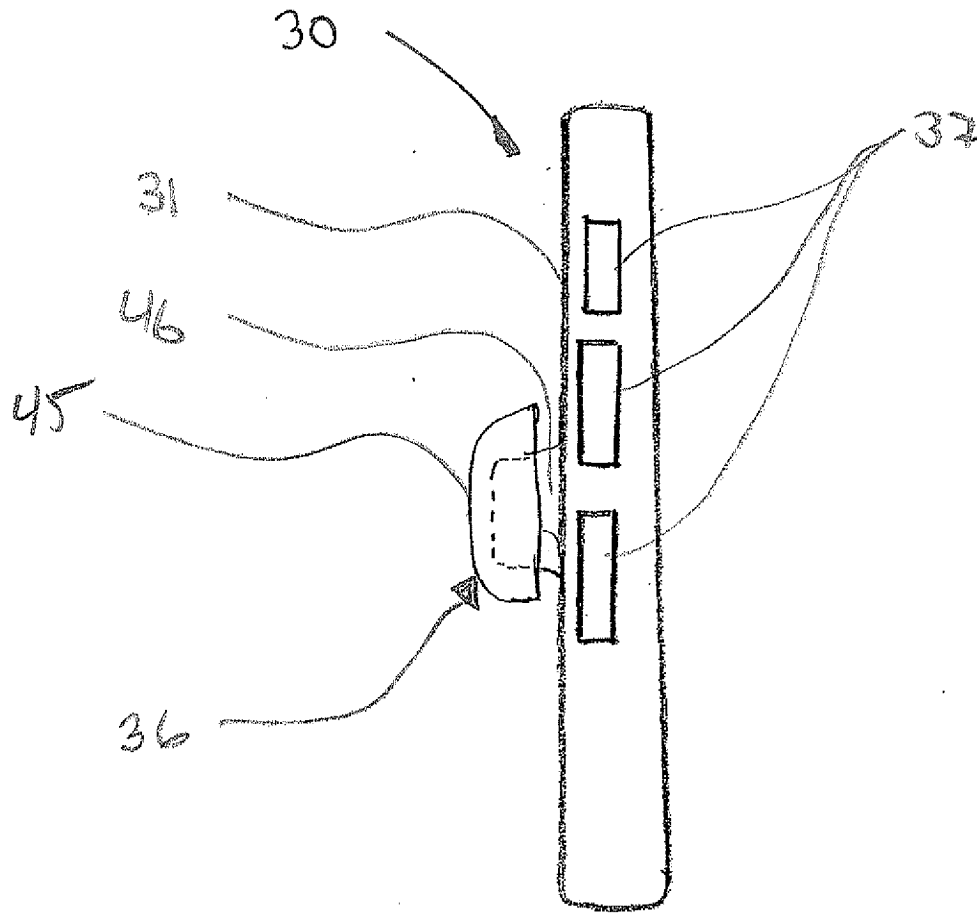


FIG. 3

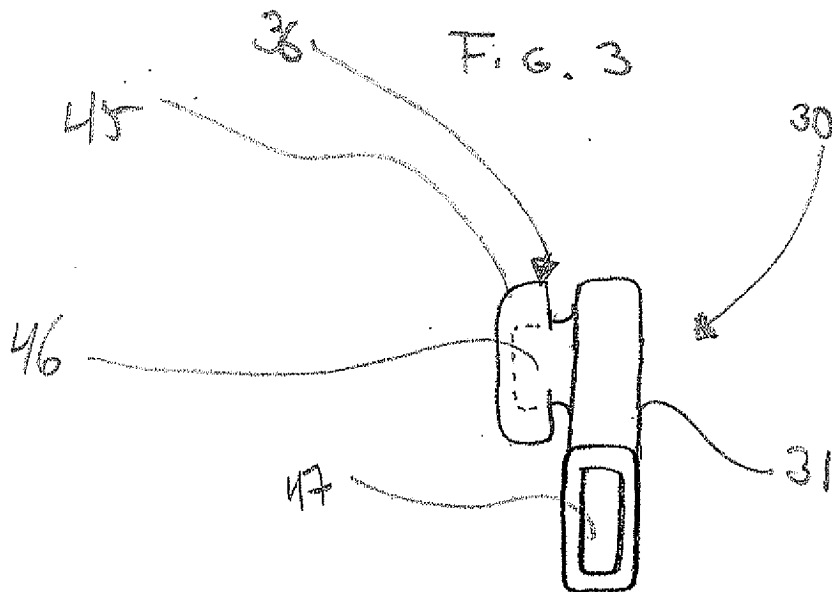


FIG. 4

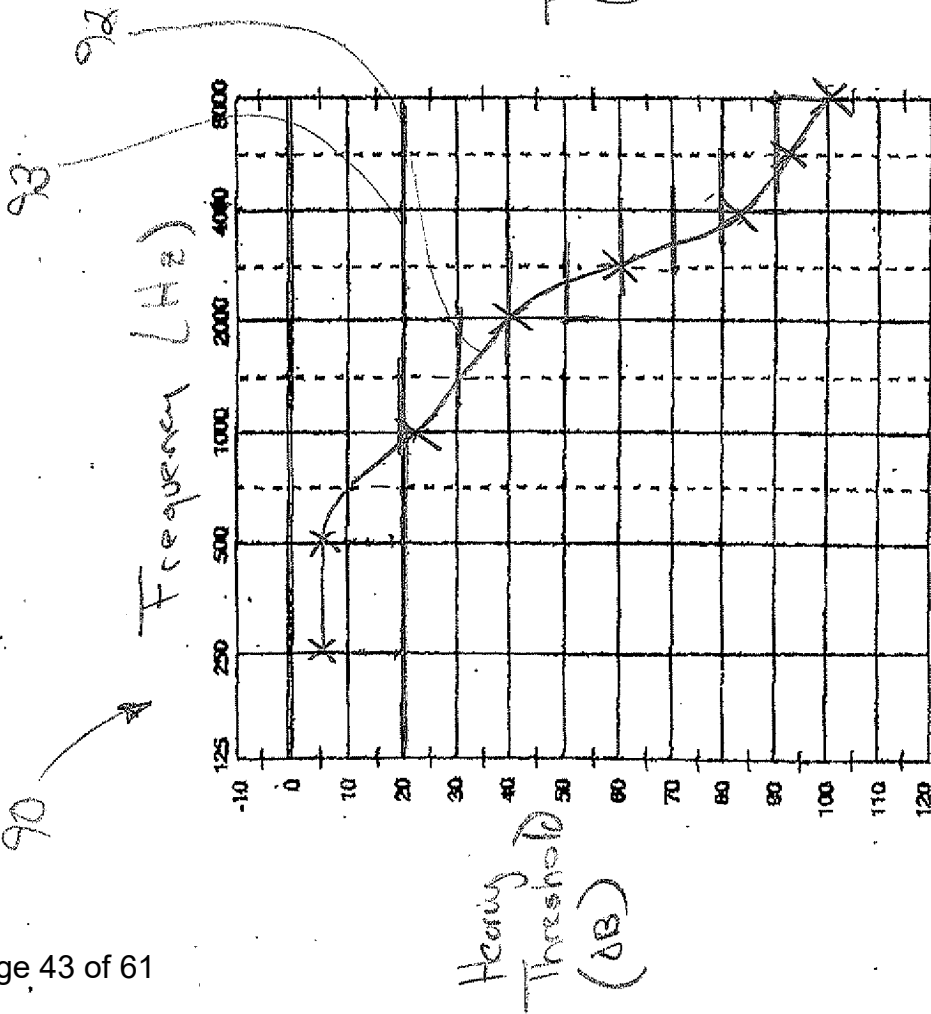


FIG. 5a

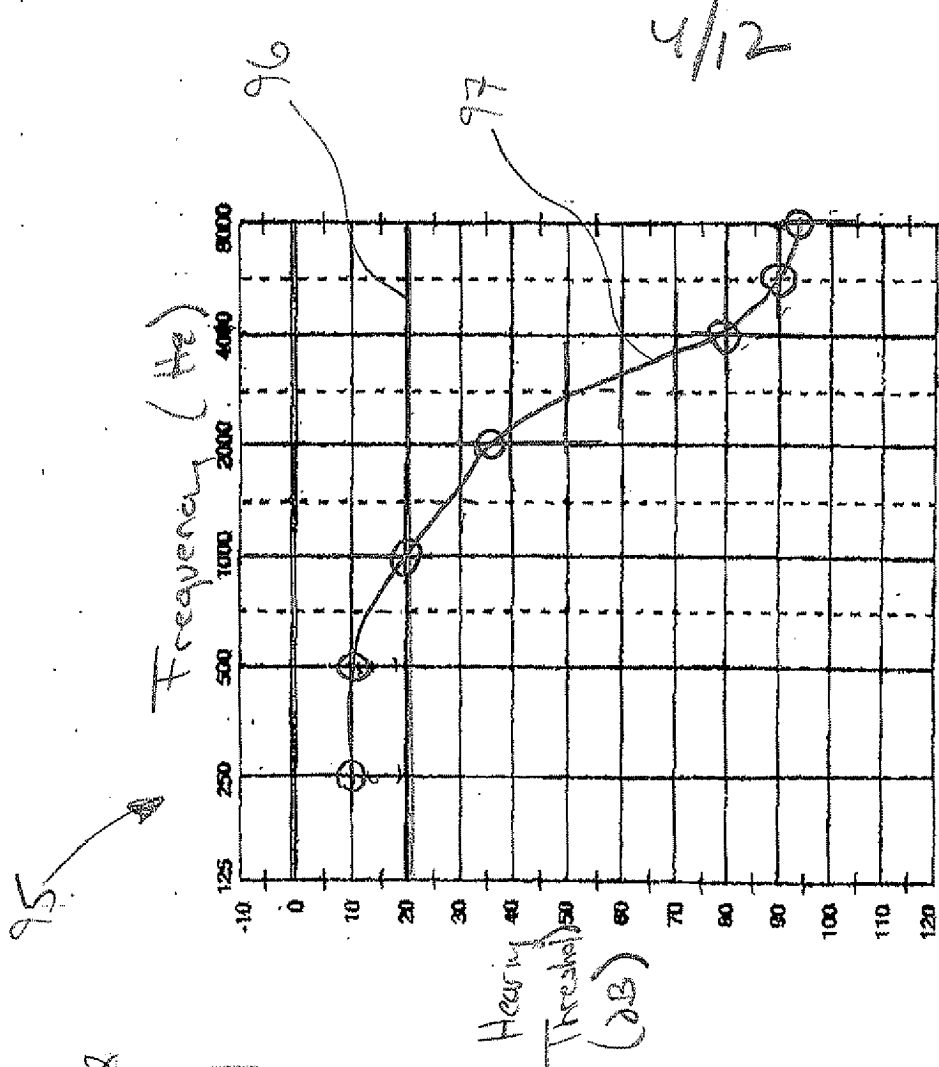


FIG. 5b

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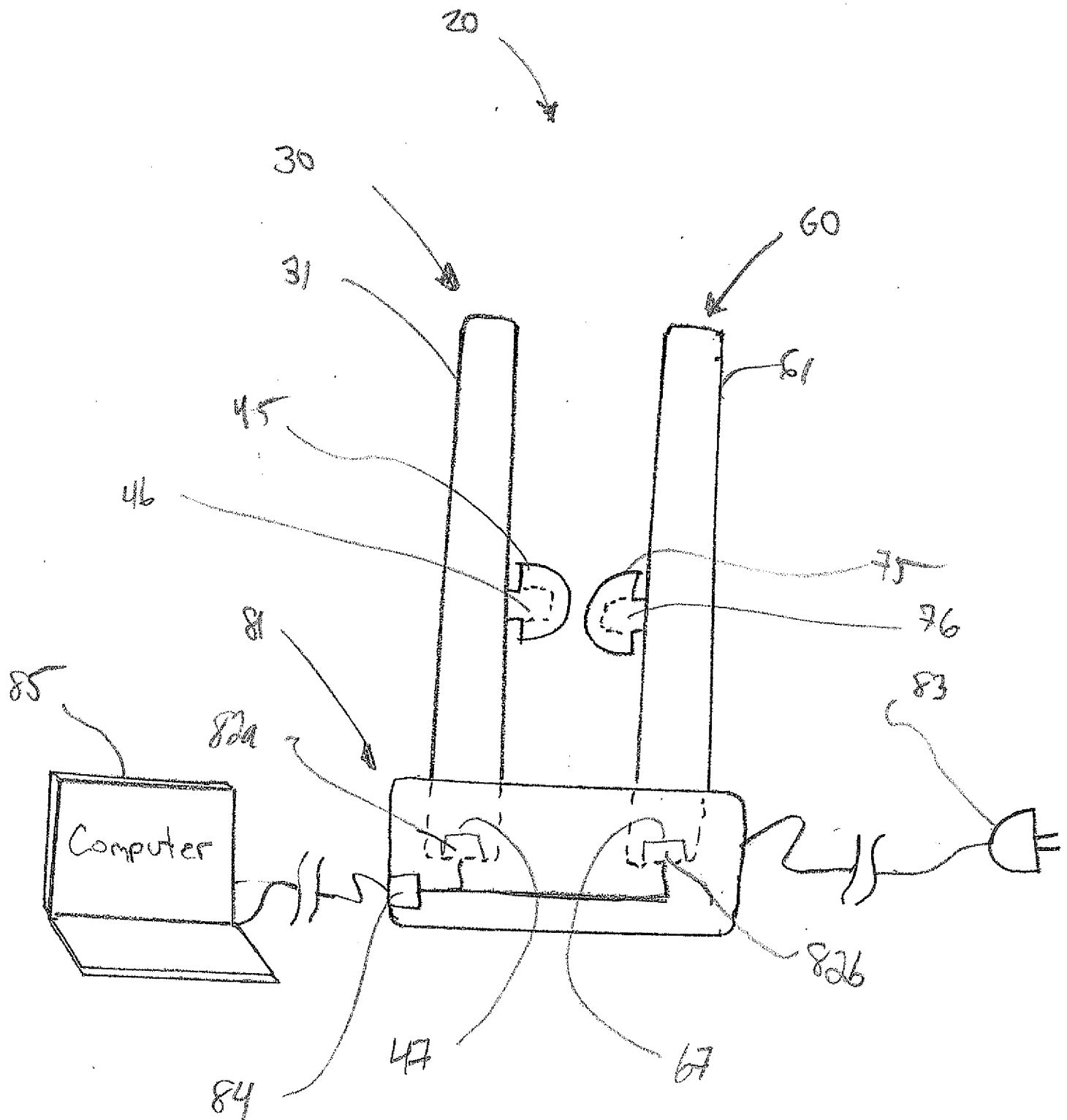
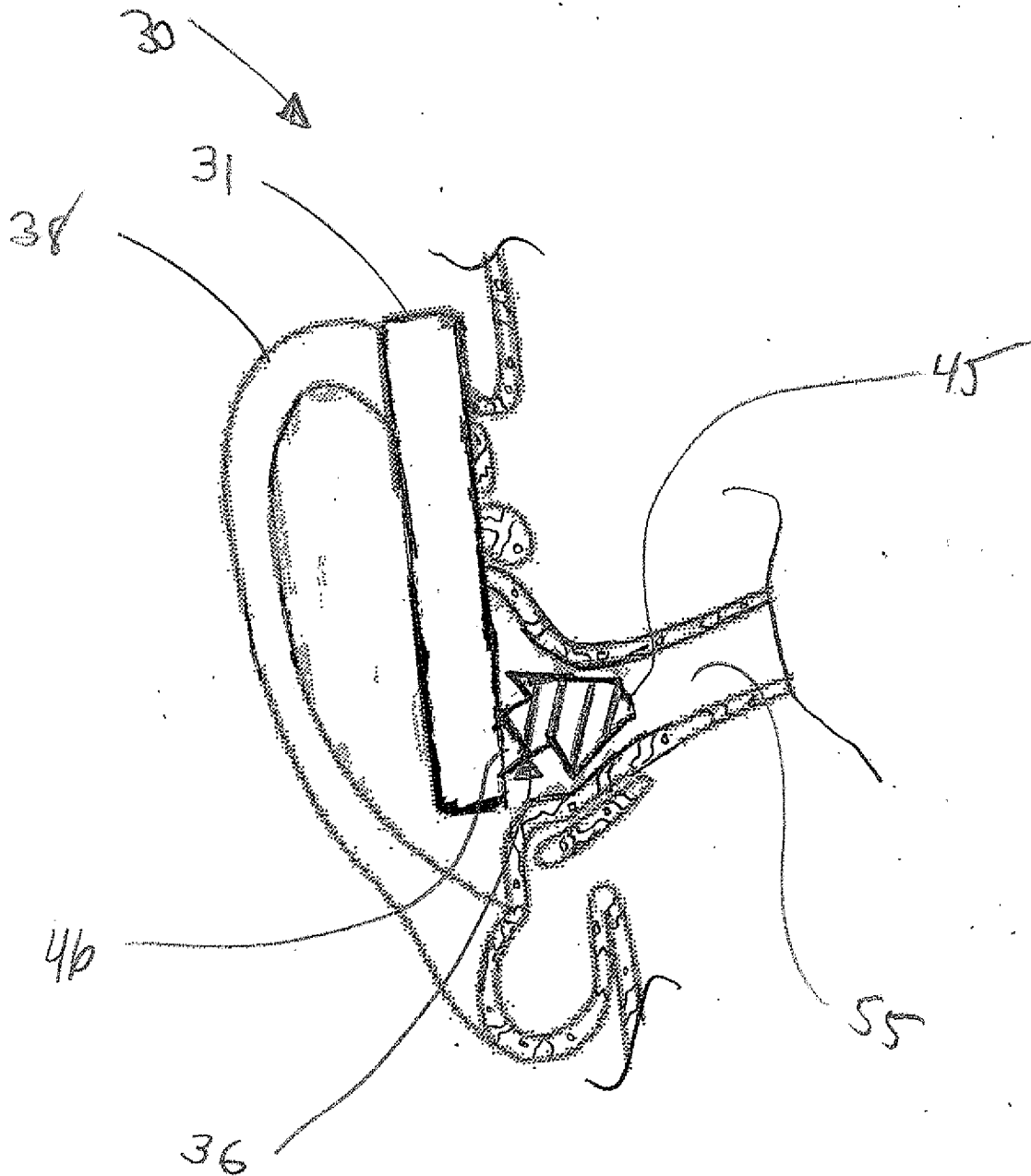


FIG. 6

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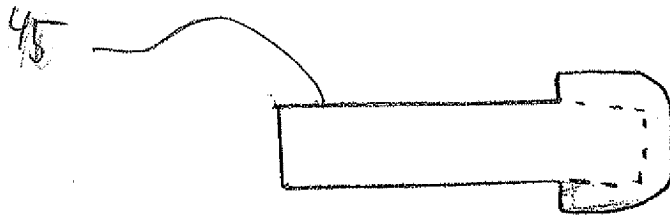


FIG. 8a

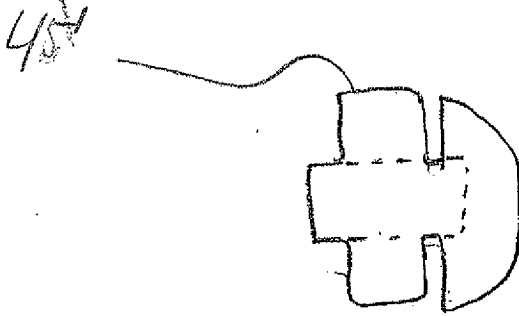


FIG. 8b

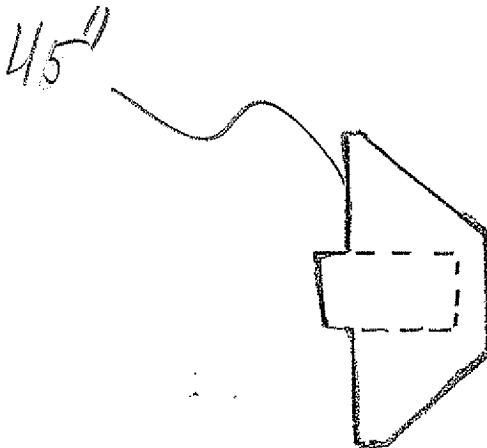


FIG. 8c

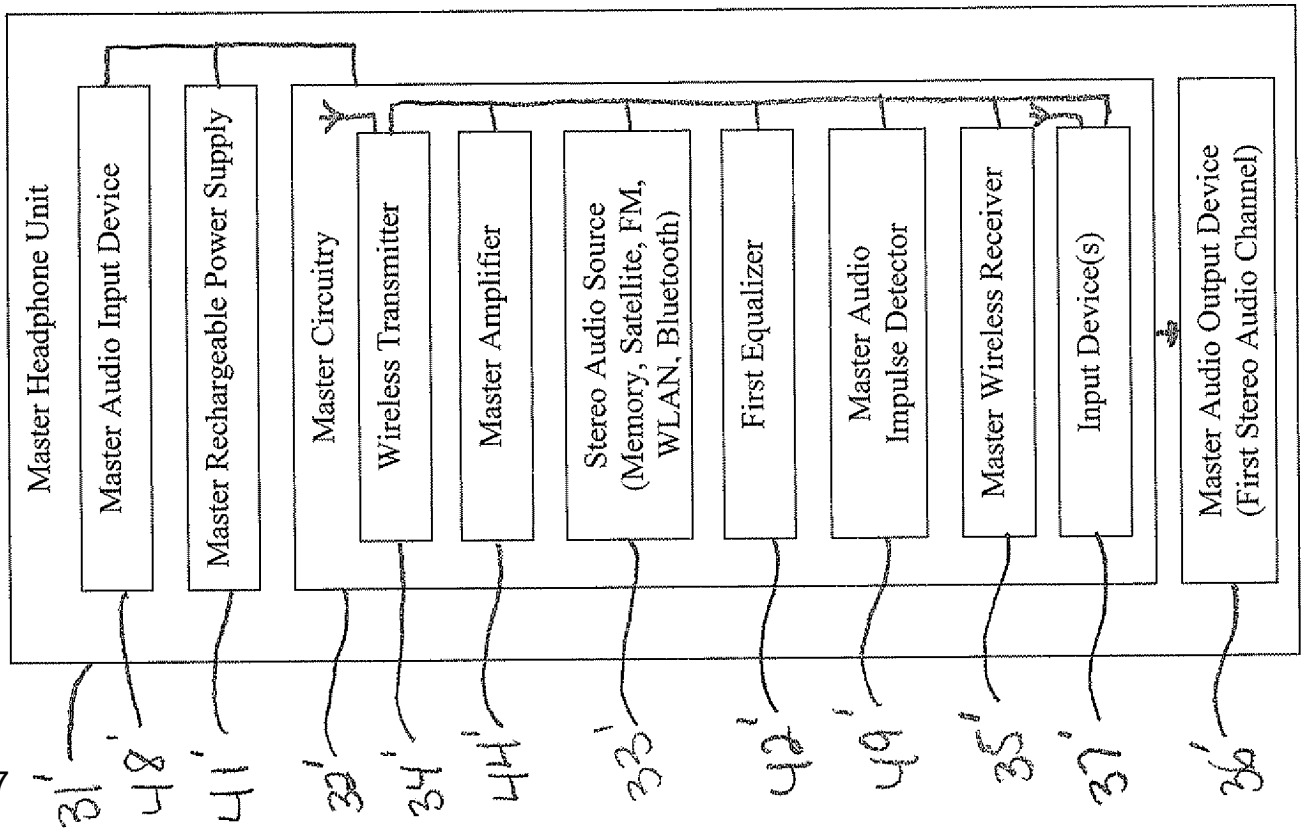
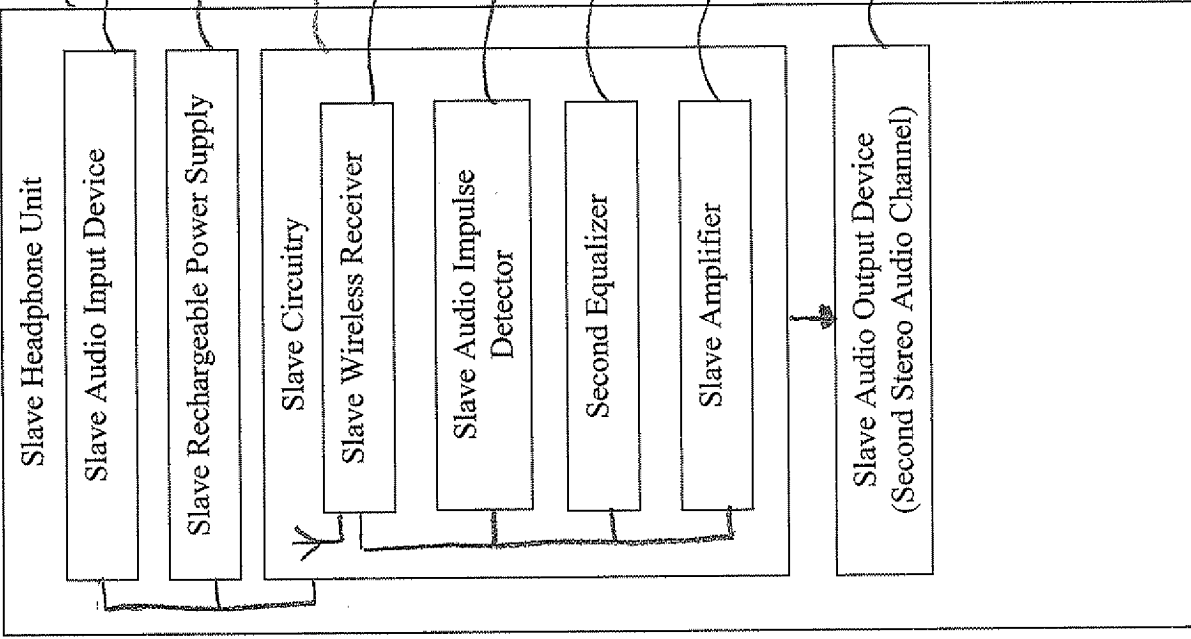


Fig. 2'



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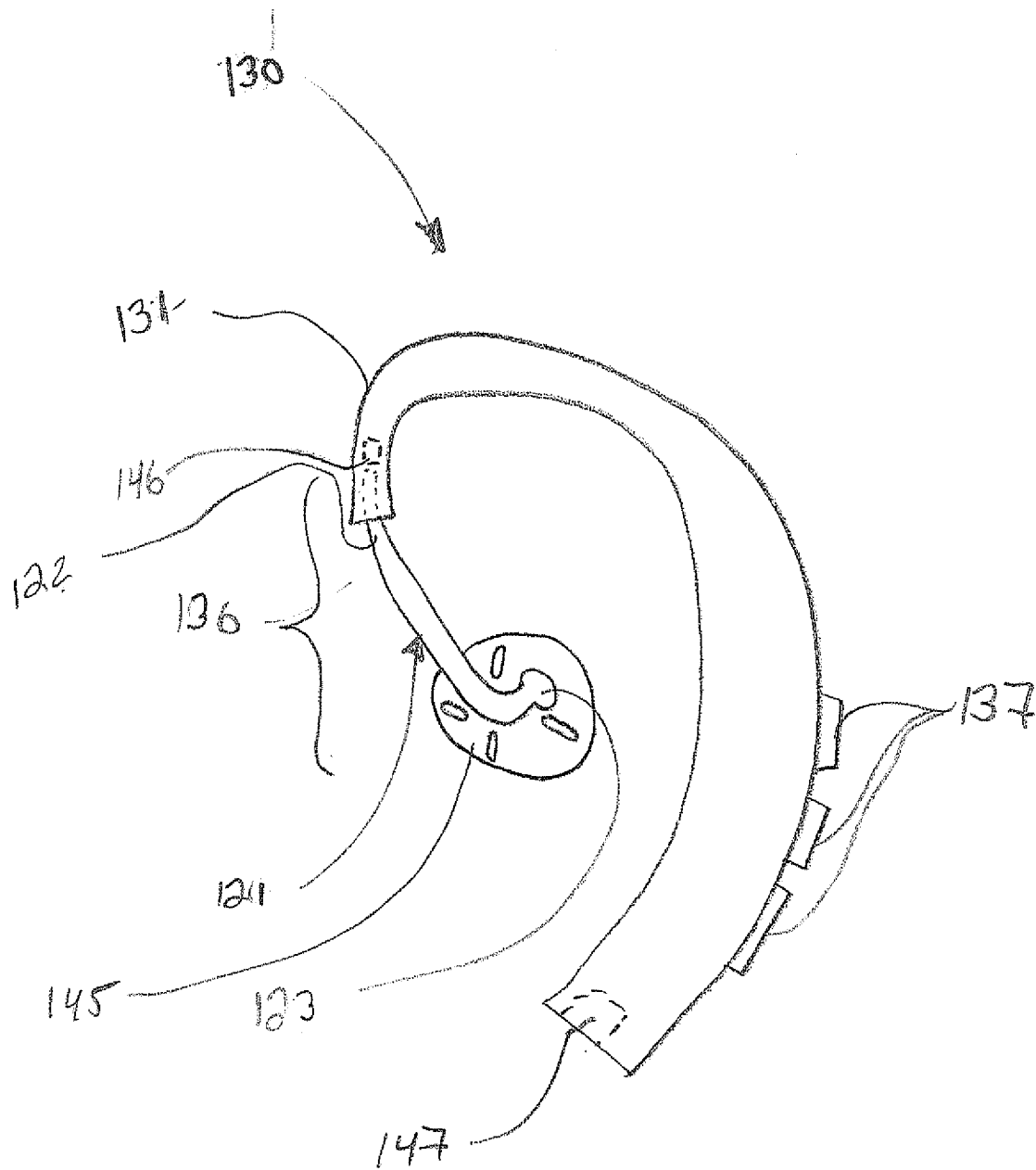


FIG. 10

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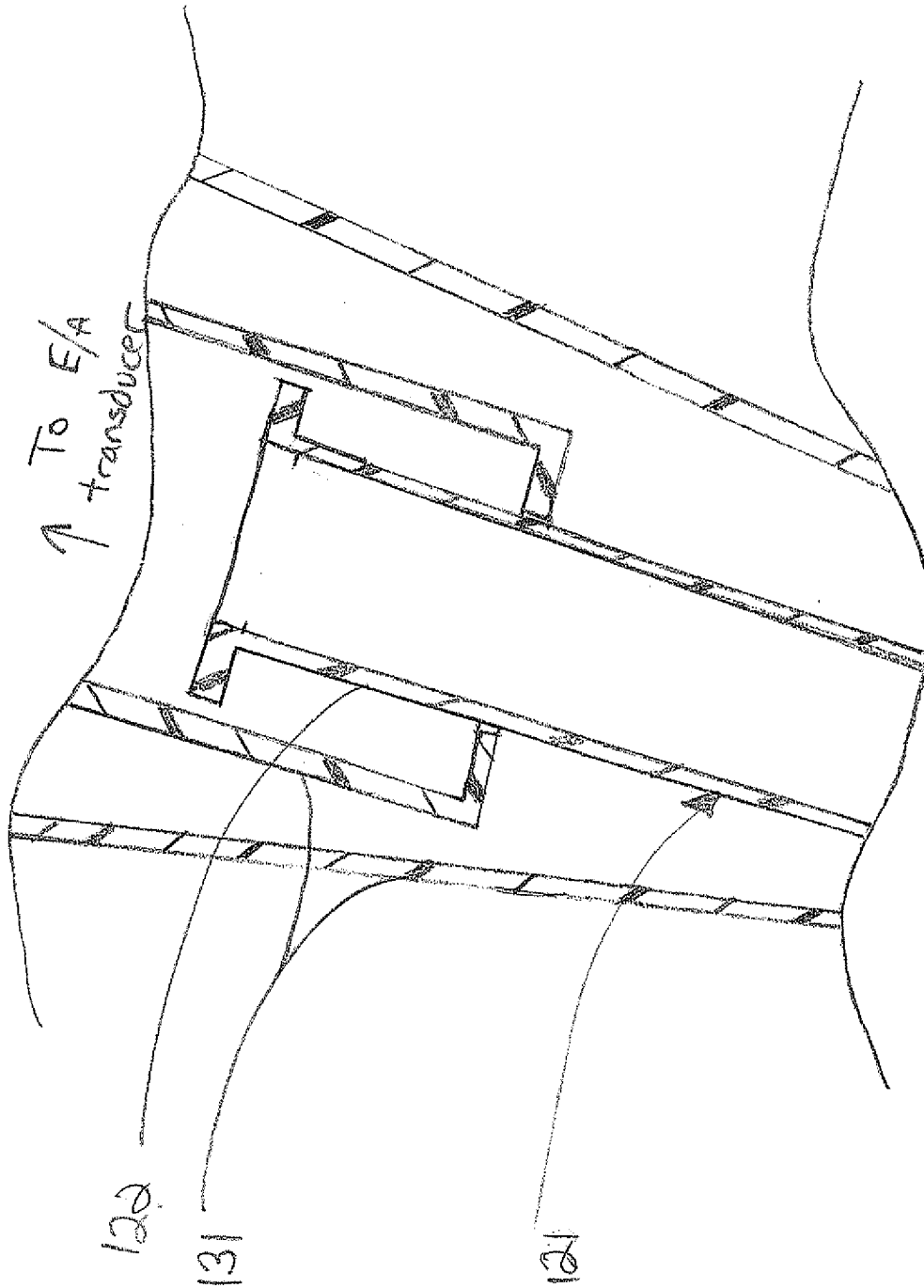
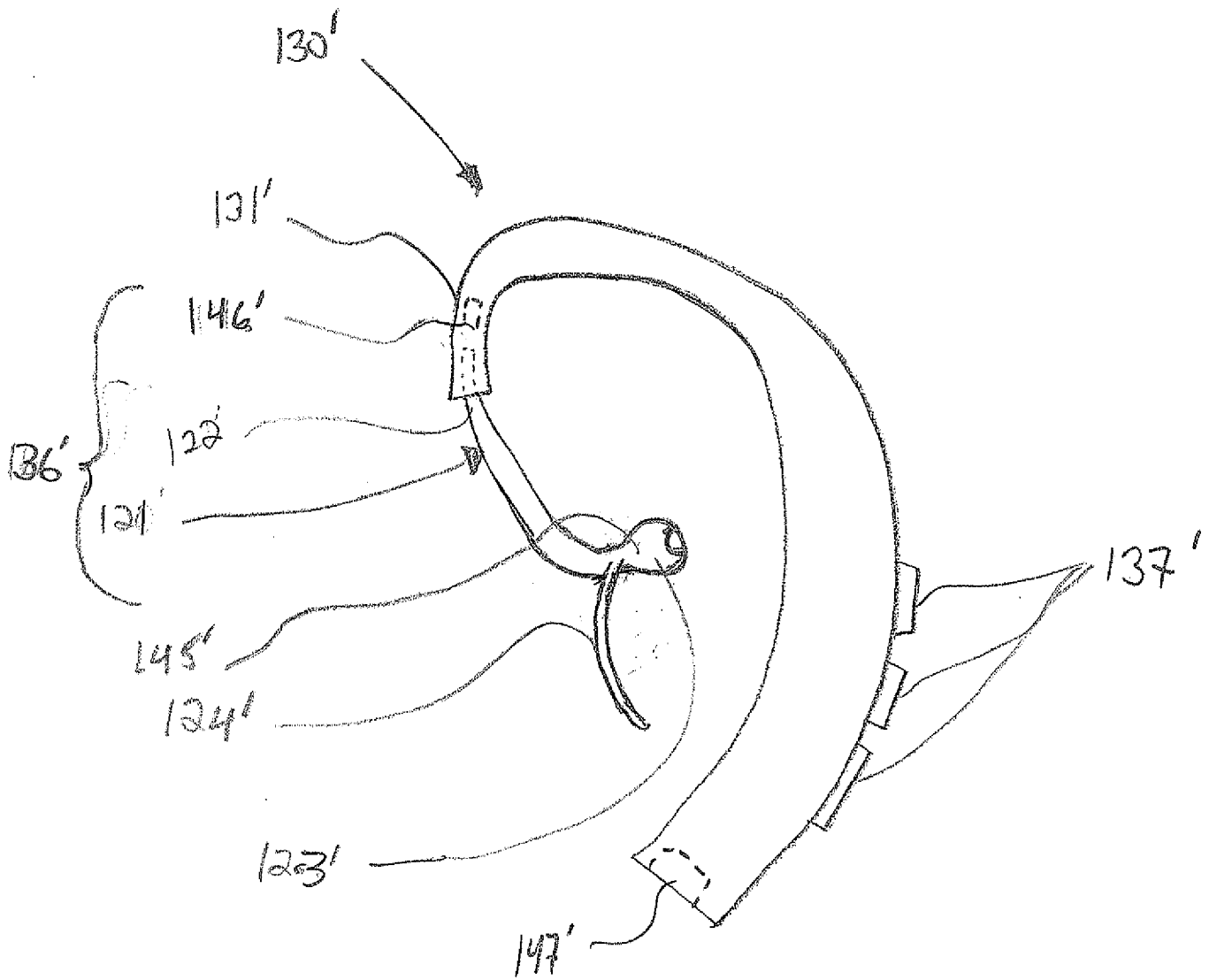


FIG. 11

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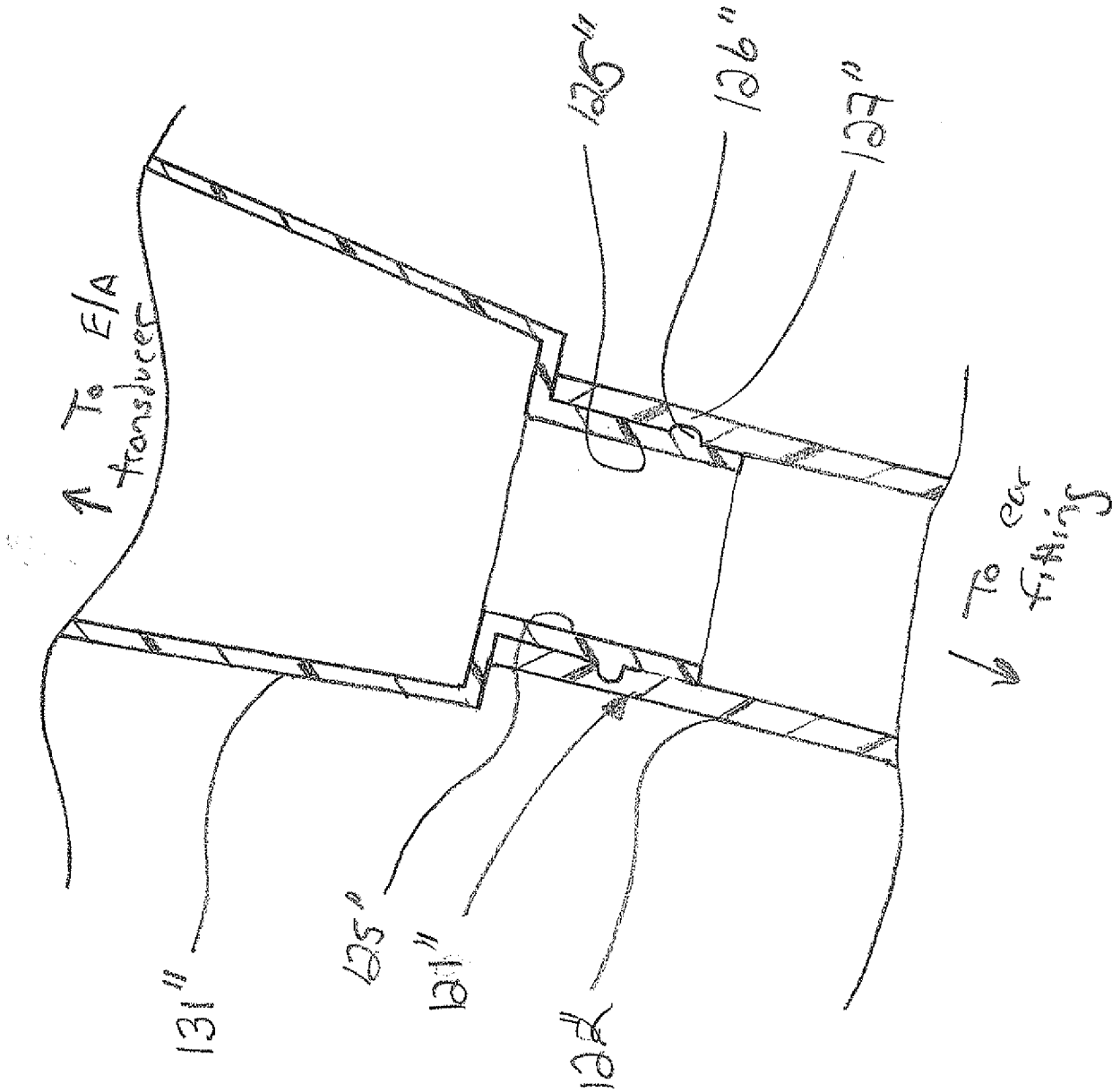


Fig. 12

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

Attorney Docket No.: **60268**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **STEREO AUDIO HEADPHONE APPARATUS FOR A USER HAVING A HEARING LOSS AND RELATED METHODS**, the specification of which:

(check one)

X is attached hereto

was filed on _____

as Application Serial No. _____

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application as defined in Title 37, Code of Federal Regulation, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s) Priority Claimed

<u> </u>	<u> </u>	<u> </u>	[]	[]
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
<u> </u>	<u> </u>	<u> </u>	[]	[]
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
<u> </u>	<u> </u>	<u> </u>	[]	[]
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under Title 35, United States Code, 120, of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u> </u>	<u> </u>	<u> </u>
(Appln Serial No.)	(Filing Date)	(Status)
		(patented, pending, aban.)

<u> </u>	<u> </u>	<u> </u>
(Appln Serial No.)	(Filing Date)	(Status)
		(patented, pending, aban.)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

English Language Declaration

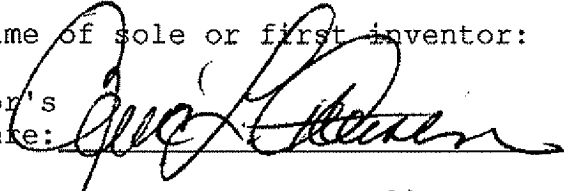
POWER OF ATTORNEY: As a named inventor, I hereby appoint the practitioners associated with Customer No.: **27975**

to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Direct Telephone Calls to:
Christopher F. Regan at (407) 841-2330

Full name of sole or first inventor: **Eric Logan HENSEN**

Inventor's

Signature: 

Date: 03/25/10

Residence: **Great Falls, Montana**
Citizenship: **Citizen of the United States**
Mailing Address: **20 Missouri Shores**
Great Falls, Montana 59404-6493

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	STEREO AUDIO HEADPHONE APPARATUS FOR A USER HAVING A HEARING LOSS AND RELATED METHODS			
First Named Inventor/Applicant Name:	Eric Logan HENSEN			
Filer:	David Scott Carus/Lisa Norberg			
Attorney Docket Number:	60268			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	82	82
Utility Search Fee	2111	1	270	270
Utility Examination Fee	2311	1	110	110
Pages:				
Claims:				
Claims in excess of 20	2202	5	26	130
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				592

Electronic Acknowledgement Receipt

EFS ID:	7283918
Application Number:	12731397
International Application Number:	
Confirmation Number:	1060
Title of Invention:	STEREO AUDIO HEADPHONE APPARATUS FOR A USER HAVING A HEARING LOSS AND RELATED METHODS
First Named Inventor/Applicant Name:	Eric Logan HENSEN
Customer Number:	27975
Filer:	David Scott Carus/Lisa Norberg
Filer Authorized By:	David Scott Carus
Attorney Docket Number:	60268
Receipt Date:	25-MAR-2010
Filing Date:	
Time Stamp:	13:32:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$592
RAM confirmation Number	9873
Deposit Account	010484
Authorized User	CARUS,DAVID S.

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Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		60268_Application.pdf	1748183 2d5b6ea4ed4b4ae40972c1c0b954e641b48f103b	yes	54
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Application Data Sheet		1	1	
	Specification		2	30	
	Claims		31	38	
	Abstract		39	39	
	Drawings-only black and white line drawings		40	51	
	Oath or Declaration filed		52	54	
Warnings:					
Information:					
2	Fee Worksheet (PTO-875)	fee-info.pdf	36585 a4d4f5f788e87f8f38a92a6d7dfee7f8105649af	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1784768		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Case No. 60268

COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

Transmitted herewith for filing is the patent application of:

Inventors: Eric Logan HENSEN

For: STEREO AUDIO HEADPHONE APPARATUS FOR A USER HAVING A HEARING LOSS AND RELATED METHODS

Enclosed are:

- [X] Patent Application: 38 pages, 25 claims
[X] 12 sheets of drawings. The suggested drawing figure to be published is FIG. 1
[X] Applicant qualifies as a small entity under 37 CFR § 1.27.
[X] A declaration and power of attorney

The filing fee has been calculated as shown below:

	(Col. 1)		(Col. 2)	SMALL ENTITY		LARGE ENTITY	
FOR:	# FILED		# EXTRA	RATE	FEE	RATE	FEE
BASIC FEE					\$ 165		\$ 330
SEARCH FEE					\$ 270		\$ 540
EXAMINATION FEE					\$ 110		\$ 220
TOTAL CLAIMS	25	-20	5	X 26	\$ 130	X 52	\$
INDEP CLAIMS	3	- 3	0	X 110	\$ 0	X 220	\$
TOTAL PAGES		- 100	0	X 135*	\$ 0	X 270*	\$
* for each additional 50 sheets that exceeds 100 sheets				TOTAL	\$ 675	TOTAL	\$

- [X] The filing fee in the amount of \$ 675.00 is being paid by credit card on EFS-Web.
[X] The Commissioner is authorized to charge or credit any discrepancies in fee amounts to Deposit Account No. 01-0484.
[X] PLEASE ADDRESS CORRESPONDENCE TO ATTORNEY OF RECORD:
CHRISTOPHER F. REGAN
[X] Please associate this application with Customer No. **27975**.

March 25, 2010
Date


DAVID S. CARUS
Reg. No. 59,291

Date: 03/25/10

Approved for use through 7/31/2006. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 12/731397			
APPLICATION AS FILED – PART I (Column 1) (Column 2)									
FOR	NUMBER FILED	NUMBER EXTRA	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	RATE (\$)	FEE (\$)		RATE (\$)	FEE (\$)		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	82		N/A			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	270		N/A			
TOTAL CLAIMS (37 CFR 1.16(i))	25	minus 20 = 5	N/A	110		N/A			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *	x\$26	130	OR	x\$52			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$260 (\$130 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR		x\$110			x\$220			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
			195			390			
			TOTAL	592		TOTAL			
* If the difference in column 1 is less than zero, enter "0" in column 2.									
APPLICATION AS AMENDED – PART II (Column 1) (Column 2) (Column 3)									
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY		
	Total (37 CFR 1.16(i))	*	Minus **	=	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Independent (37 CFR 1.16(h))	*	Minus ***	=	X =		OR	X =	
	Application Size Fee (37 CFR 1.16(s))				X =		OR	X =	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				N/A		OR	N/A	
				TOTAL		OR	TOTAL		
				ADD'T FEE		OR	ADD'T FEE		
(Column 1) (Column 2) (Column 3)									
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY		
	Total (37 CFR 1.16(i))	*	Minus **	=	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Independent (37 CFR 1.16(h))	*	Minus ***	=	X =		OR	X =	
	Application Size Fee (37 CFR 1.16(s))				X =		OR	X =	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				N/A		OR	N/A	
				TOTAL		OR	TOTAL		
				ADD'T FEE		OR	ADD'T FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.									

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.