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(71) Applicant 514198482

Belue Creative Co., Ltd.

1-19-25-104 Nakane, Soka-shi,
Saitama-ken

(71) Applicant 514199261

Fukuji Matsunari

1-28-8 Otaniguchi, Itabashi-ku, Tokyo

(74) Agent 100083806

Patent Attorney Hidekazu Miyoshi

(74) Agent 100101247

Patent Attorney Shunichi Takahashi

(74) Agent 100095500

Patent Attorney Masakazu Ito

(74) Agent 100098327

Patent Attorney Toshio Takamatsu

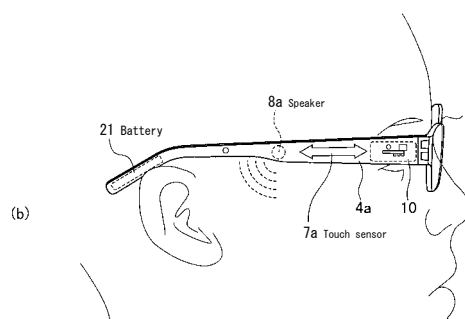
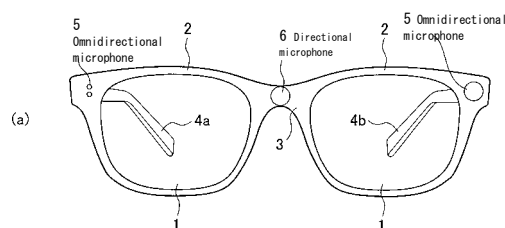
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(54) [Title of the Invention] Eyeglass-type hearing aid

(57) [Abstract]

[Problem to be solved] To provide an eyeglass-type hearing aid that is easy to operate and allows the user to easily hear the voice of the person they are looking at.

[Means for solving the problems] The device consists of a directional microphone 6 provided on the eyeglass bridge 3 that connects the eyeglass rims 2 surrounding the two lenses 1; omnidirectional microphones 5 provided on the left and right ends of the eyeglass rims; speakers 8a provided on the left frame 4 and right frame 4 connected to the eyeglass rims; a first touch sensor 7a provided on one of the left or right frames; and a control circuit 10 that turns on the directional microphone 6 based on a signal from the first touch sensor and outputs an audio signal to the speaker 8a.



[Selection drawing] FIG. 1

[Scope of Claims]

[Claim 1]

An eyeglass-type hearing aid characterized by a directional microphone provided on the eyeglass bridge connecting the eyeglass rims surrounding two lenses;
omnidirectional microphones provided on the left and right ends of the eyeglass rims;
speakers provided on the left and right frames connected to the eyeglass rims;
a first touch sensor 7a provided on one of the left or right frames;
and a control circuit that turns on the directional microphone based on a signal from the first touch sensor and outputs an audio signal to the speaker

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[Claim 2]

An eyeglass-type hearing aid according to Claim 1, characterized in that the control circuit adjusts the volume of the speaker according to the amount of sliding of the first touch sensor based on a signal from the first touch sensor.

[Claim 3]

An eyeglass-type hearing aid according to Claim 1 or 2, characterized in that it comprises a second touch sensor provided on the other of the left frame and the right frame,
and the control circuit turns on the omnidirectional microphone based on the signal from the second touch sensor and outputs an audio signal to the speaker.

[Claim 4]

An eyeglass-type hearing aid according to any one of Claims 1 to 3, characterized in that it comprises of a band-pass filter that passes frequencies from 4 kHz to 8 kHz included in the audio signal and outputs the frequencies to the speaker.

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[Claim 5]

An eyeglass-type hearing aid according to any one of Claims 1 to 4, characterized in that at least one of the left frame and the right frame is equipped with a microphone that senses a predetermined sound pressure and outputs a sound pressure sensing signal,
and the control circuit switches the power supply for the control circuit from a standby state to a normal state when a sound pressure sensing signal is input from the microphone, and that switches the power supply from a normal state to a standby state when no sound pressure sensing signal is input from the microphone.

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[Claim 6]

The eyeglass-type hearing aid according to any one of Claims 1 to 5, characterized in that a cavity is formed in at least one of the left frame and the frame so as to surround the speaker, and a hole is formed from the cavity toward the position of the ear.

[Detailed Description of Invention]

[Technical Field]

[0001]

The present invention relates to an eyeglass-type hearing aid that is attached to eyeglasses and is particularly used by the elderly and people with hearing loss.

[Background Technology]

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[0002]

As an example of an eyeglass-type hearing aid, the eyeglass-type 3D hearing aid described in Patent Literature 1 is known. This eyeglass-type 3D hearing aid consists of a microphone, a hearing aid amplification adjuster, an earphone, and internal conductors integrated into a single structure.

[0003]

The eyeglass-type 3D hearing aid has a directional miniature microphone fixed near the hinges of the left and right eyeglass frames. The signal from the microphone is input to the hearing aid's amplification adjuster via wires inside the eyeglass frame and a power plug lead wire. Microphone sensitivity volume, volume control, and tone quality volume are arranged to make it easy for elderly people to operate. The amplified and adjusted audio signal is guided from the frame wires to the left and right ear canals, and the sound is reproduced through the earphone.

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[0004]

According to this design, it is possible to provide an easy-to-use eyeglass-type hearing aid that is easy for elderly people to operate themselves, and that is capable of 3D (sound direction and depth perception) sound playback without any feedback, and that can be worn for extended periods of time while wearing the eyeglasses.

[Prior art literature]

[Patent literature]

[0005]

[Patent Literature 1] Japanese Laid-Open Patent Application No. 2012-147405

[Summary of Invention]

[Problems to be Solved by the Invention]

[0006]

However, in the case of the eyeglass-type 3D hearing aid described in Patent Literature 1, the earphones are located on the outside of the glasses, making it inconvenient for elderly users to use, as they have to put the earphones in their ears each time they want to hear sound.

[0007]

Furthermore, because directional miniature microphones were installed on both the left and right frames, the device picked up not only the voice of the person the elderly wearer was conversing with, but also other ambient sounds. As a result, the ambient sounds can be amplified and become background noise, making it difficult for the wearer to hear the voice of the people they are talking with.

[0008]

The object of the present invention is to provide eyeglass-type hearing aids that are easy to operate and allow the user to easily hear the voice of the person they are looking at.

[Means for Solving the Problems]

[0009]

To solve the above problems, the eyeglass-type hearing aid according to the present invention is characterized by comprising of a directional microphone provided on an eyeglass bridge connecting the eyeglass rims surrounding the two lenses; omnidirectional microphones provided on the left and right ends of the eyeglass rims, respectively; speakers provided on the left and right frames connected to the eyeglass rims, respectively; a first touch sensor provided on one of the left and right frames; and a control circuit that turns on the directional microphone based on a signal from the first touch sensor and outputs an audio signal to the speakers. Furthermore, the control circuit has a band-pass filter that outputs low sounds from 125 Hz to 500 Hz, which are particularly difficult to hear for people with low-frequency sensorineural hearing loss, to the speakers in an easily audible manner. In addition, it also includes a band-pass filter that makes high-frequency sounds in the 4000Hz to 8000Hz range, which are common in age-related hearing loss (sensorineural hearing loss), easier to hear when outputting them to the speaker.

[Effects of the Present Invention]

[0010]

According to the eyeglass-type hearing aid of the present invention, because the speakers are provided on the left frame and the right frame, respectively, and the directional microphone can be turned on and the voice signal can be output to the speakers by simply touching the first touch sensor provided on one of the left frame and the right frame, the operation becomes much easier.

[0011]

Moreover, because a directional microphone is installed on the eyeglass bridge, the directional microphone only picks up the voice of the person the wearer is looking at, thereby simplifying the ability of the wearer to hear what the other person is saying.

[Brief Description of Drawings]

[0012]

[FIG. 1] This figure shows a front view and the configuration of the right frame of an eyeglass-type hearing aid according to Embodiment 1 of the present invention.

[FIG. 2] This figure shows the configuration of the left frame of the eyeglass-type hearing aid according to Embodiment 1 of the present invention.

[FIG. 3] This is a circuit diagram of the eyeglass-type hearing aid according to Embodiment 1 of the present invention.

[FIG. 4] This figure shows the configuration provided on the frame of an eyeglass-type hearing aid according to Embodiment 2 of the present invention.

[FIG. 5] This figure illustrates the operation of a component provided on the frame of an eyeglass-type hearing aid according to Embodiment 2 of the present invention.

[FIG. 6] This figure shows the configuration for turning on the power of the eyeglass-type hearing aid according to Embodiment 3 of the present invention.

[FIG. 7] This figure shows the configuration for turning on the power of the eyeglass-type hearing aid according to Embodiment 4 of the present invention.

[FIG. 8] This is a circuit diagram of the eyeglass-type hearing aid according to Embodiments 3 and 4 of the present invention.

[FIG. 9] This figure shows the configuration for turning on the power of the eyeglass-type hearing aid according to Embodiment 5 of the present invention.

[FIG. 10] This figure shows the configuration of an eyeglass-type hearing aid according to Embodiment 6 of the present invention.

[FIG. 11] This figure shows the configuration of an eyeglass-type hearing aid according to Embodiment 7 of the present invention.

[Detailed Description of the Embodiments]

[0013]

Hereinafter, embodiments of the eyeglass-type hearing aid of the present invention will be described in detail with reference to the drawings.

[Embodiment 1]

[0014]

FIG. 1(a) is a front view of an eyeglass-type hearing aid according to Embodiment 1 of the present invention, and FIG. 1(b) is a diagram showing the configuration of the right frame of the eyeglasses. The eyeglass-type hearing aid is attached to the eyeglasses, and as shown in FIG. 1(a), these eyeglasses include two lenses 1 arranged on the left and right, eyeglass rims 2 surrounding the two lenses 1, an eyeglass bridge 3 connecting the eyeglass rims 2, and a right frame 4a and a left frame 4b connected to the eyeglass rims 2. The eyeglass rims 2, the right frame 4a, and the left frame 4b are connected by a hinge (not shown).

[0015]

As shown in FIG. 1(a), tiny omnidirectional microphones 5 are provided at the upper left and upper right ends of the eyeglass rims 2, and a tiny directional microphone (directional shotgun microphone) 6 is provided on the eyeglass bridge 3. The omnidirectional microphone 5 picks up the sound from all directions. The directional microphone 6 has directionality and is designed to pick up the voices of the people conversing with the hearing-impaired individuals or the elderly wearer.

[0016]

As shown in FIG. 1(b), the first control board 10 is located within the frame closest to the eyeglass rim 2 in the right frame 4a. A touch sensor 7a is provided in the right frame 4a, in the next frame closest to the eyeglass rim 2. The touch sensor 7a is connected to the sensor control unit 13 in the first control board 10 by a wire (not shown).

[0017]

A speaker 8a is located approximately in the center of the right frame 4a. This speaker 8a is connected to the amplifier 12 in the first control board 10 by a wire (not shown). A battery 21 (contactless rechargeable battery), such as a lithium polymer battery, is provided at the rear end of the right frame 4a.

[0018]

The first control board 10 is provided within the left frame 4b, in the portion closest to the eyeglass rim 2, as shown in FIG. 2. The touch sensor 7b is provided within the left frame 4b, in the portion closest to the eyeglass rim 2. This touch sensor 7b is connected to the sensor control unit 13 in the first control board 10 by a wire (not shown).

[0019]

A speaker 8b is located approximately in the center of the left frame 4b. This speaker 8b is connected to the amplifier 12 in the first control board 10 by a wire (not shown). A battery 21, such as a lithium polymer battery

(contactless rechargeable battery), is provided at the rear end of the left frame 4b.

[0020]

FIG. 3 shows a circuit diagram of an eyeglass-type hearing aid according to Embodiment 1 of the present invention. As shown in FIG. 3, the first control board 10 (corresponding to the control circuit of the present invention) includes a microphone control unit 11, an amplifier 12, a sensor control unit 13, and a sound modulation unit 14. The battery unit 20 includes a battery 21 and a contactless charging control unit 22. The contactless charging control unit 22 controls the amount of charge in the battery 21, which is made up of a contactless rechargeable battery.

[0021]

The microphone control unit 11 is connected to an omnidirectional microphone 5 and a directional microphone 6. Based on a control signal from the sensor control unit 13, the microphone control unit 11 controls the on/off status of the omnidirectional microphone 5 and the directional microphone 6. When either the omnidirectional microphone 5 or the directional microphone 6 is on, the microphone control unit 11 outputs the audio signal from the on microphone to the amplifier 12.

[0022]

The amplifier 12 operates using power supplied by the battery 21, amplifying the audio signal from the microphone control unit 11 and outputting it to the speaker 8a located on the right frame and the speaker 8b located on the left frame.

[0023]

Touch sensors 7a and 7b are connected to the sensor control unit 13. The touch sensor 7a outputs an ON signal to the sensor control unit 13 when it is touched for a predetermined time, for example, 3 seconds. Based on the ON signal from the touch sensor 7a, the sensor control unit 13 outputs an ON control signal to the microphone control unit 11 to turn on the directional microphone 6.

[0024]

When the touch sensor 7a is touched again for a predetermined time, for example, 3 seconds, it outputs an OFF signal to the sensor control unit 13. Based on the OFF signal from the touch sensor 7a, the sensor control unit 13 outputs an OFF control signal to the microphone control unit 11 to turn off the directional microphone 6.

[0025]

The touch sensor 7b outputs an ON signal to the sensor control unit 13 when it is touched for a predetermined time, for example, 3 seconds. Based on the ON signal from the touch sensor 7b, the sensor control unit 13 outputs an ON control signal to the microphone control unit 11 to turn on the omnidirectional microphone 5.

[0026]

When the touch sensor 7b is touched again for a predetermined time, for example, 3 seconds, it outputs an OFF signal to the sensor control unit 13. Based on the OFF signal from the touch sensor 7b, the sensor control unit 13 outputs an OFF control signal to the microphone control unit 11 to turn off the omnidirectional microphone 5.

[0027]

As described above, according to the eyeglass-type hearing aid of Embodiment 1, as shown in FIG. 1(b), speakers 8a and 8b are provided on the left frame and right frame, respectively, and when the touch sensor 7a provided on the right frame is touched for a predetermined time, for example, 3 seconds, an ON signal is output to the sensor control unit 13. Therefore, the microphone control unit 11 turns on the directional microphone 6 based on the ON signal from the sensor control unit 13 and outputs the audio signal to the speakers 8a and 8b. Consequently, people with hearing impairments and the elderly can hear the voices of those who are speaking with a simple operation.

[0028]

Moreover, because the directional microphone 6 is installed on the glasses bridge 3, the directional microphone 6 only picks up the voice of the person the wearer is looking at, which reduces the background noise and allows for more accurate listening of the voice of the person the wearer is engaged in conversation with.

[0029]

Furthermore, when the touch sensor 7a screen is slid by hand, the sensor control unit 13 outputs a slide amount signal to the sound modulation unit 14 according to the amount of sliding of the touch sensor 7a. The sound modulation unit 14 changes the modulation degree of the sound according to the slide amount signal from the sensor control unit 13 and outputs it to the speakers 8a and 8b via the amplifier 12. This allows the volume of the

speakers 8a and 8b to be adjusted according to the amount of the slide on the touch sensor 7a.

[0030]

It should be noted that instead of sliding the touch sensor 7a, the volume of the speakers 8a and 8b may be adjusted according to the number of times the touch sensor 7a is touched.

[0031]

In addition, when the screen of touch sensor 7b is slid by hand, the sensor control unit 13 outputs a slide amount signal to the microphone control unit 11 according to the amount of sliding of touch sensor 7b. The microphone control unit 11 can adjust the directivity of the directional microphone 6 according to the slide amount signal from the sensor control unit 13.

[0032]

It should be noted that instead of sliding the touch sensor 7b, the directivity of the directional microphone may be adjusted according to the number of times the touch sensor 7b is touched.

[0033]

Moreover, people with age-related hearing loss (those who are hard of hearing) generally have difficulty hearing high frequencies (4kHz to 8kHz), making it difficult for them to accurately understand the speech. However, they are still able hear low-frequency sounds normally. For this reason, the band-pass filter (BPF) 12a provided in the amplifier 12 allows the 4kHz to 8kHz frequency range of the audio signal sent from the microphone control unit 11 to pass through, amplifying the 4kHz to 8kHz audio signal in the amplifier 12, while blocking audio signals in other frequency bands. The amplified sound is output to speakers 8a and 8b, and the sound is then output from speakers 8a and 8b towards the ear canal. Consequently, people with age-related hearing loss can accurately hear high frequency sounds (4kHz to 8kHz).

[0034]

Additionally, the first control board 10 may be equipped with a band-pass filter that makes low-frequency sounds from 125 Hz to 500 Hz, which are particularly difficult to hear for people with low-frequency hearing loss, more audible when outputting them to the speaker.

[Embodiment 2]

[0035]

FIGS. 4 and 5 show the configuration provided on the frame of the eyeglass-type hearing aid according to Embodiment 2 of the present invention. As shown in FIG. 4, an acceleration sensor 17 is provided in the frame portion of the left frame 4b that is closest to the eyeglass rim 3. This acceleration sensor 17 detects the acceleration when a person with hearing impairment listens to something, and outputs the detected acceleration signal to the sensor control unit 13.

[0036]

The sensor control unit 13 outputs the acceleration signal from the acceleration sensor 17 to the sound modulation unit 14. The sound modulation unit 14 changes the modulation depth of the sound according to the magnitude of the acceleration signal and outputs it to the speaker. In other words, the volume of the speaker on the side of the tilted ear can be automatically increased, allowing people with hearing impairments to hear the sound more clearly.

[0037]

Furthermore, as shown in FIG. 4, a button 15 is provided on the frame corresponding to the ear position within the left frame 4b. One end of the arm 16 is connected to this button 15, and a speaker 8 is provided at the other end of the arm 16. FIG. 4 shows the state in which the arm 16 and speaker 8 are extended from the frame 4b.

[0038]

It should be noted that although FIG. 4 shows an example in which the acceleration sensor 17 and the button 15 are provided on the left frame 4b, it is to be understood that the acceleration sensor 17 and the button 15 are also provided on the right frame 4a.

[0039]

As shown in FIG. 5, in the initial state, the arm 16 and the speaker 8 are built into the right frame 4a. When a hearing-impaired person presses the button 15, the arm 16 and the speaker 8 extend from frame 4a, and the speaker 8 fits into the ear canal 30.

[0040]

This allows the person with the hearing impairment to hear more easily by simply pressing button 15, which causes the speaker 8 to fit into the ear canal 30.

[0041]

The present invention is not limited to the eyeglass-type hearing aids according to Embodiments 1 and 2. For example, the directional microphone 6 and omnidirectional microphone 5 may be automatically turned off if the user falls asleep while wearing the eyeglass-type hearing aid. In this case, if no sound is input to the directional microphone 6 and the omnidirectional microphone 5 for a predetermined period of time or longer, and the touch sensors 7a and 7b are not operated for a predetermined period of time or longer, the microphone control unit 11 may turn off the directional microphone 6 and the omnidirectional microphone 5.

[0042]

Furthermore, the eyeglass-type hearing aid according to Embodiment 1 and the eyeglass-type hearing aid according to Embodiment 2 may be used in combination. In this way, the effects of the eyeglass-type hearing aid according to Embodiment 1 and the eyeglass-type hearing aid according to Embodiment 2 can be obtained.

[Embodiment 3]

[0043]

FIG. 6 shows the configuration for turning on the power of the eyeglass-type hearing aid according to Embodiment 3 of the present invention. The eyeglass-type hearing aid according to Embodiment 3 is an additional configuration to the eyeglass-type hearing aid according to Embodiment 1 shown in FIG. 1, with the configuration shown in FIG. 6 being added.

[0044]

FIG. 6(a) shows a state where the angle between the front 31 and the temple 32 (corresponding to the left and right frames 4a and 4b shown in FIG. 1) of the eyeglass-type hearing aid is less than 75 degrees; FIG. 6(b) shows a state where the angle between the front 31 and the temple 32 is 75 degrees; and FIG. 6(c) shows a state where the angle between the front 31 and the temple 32 is 90 degrees. In FIG. 6(a), a power switch 34 is attached to the hinge 33 that connects the front 31 and the temple 32. The power switch 34 can be a mechanical switch, an electric switch, or an electromagnetic switch, etc.

[0045]

As shown in FIGS. 6(b) and 6(c), the power switch 34 turns on when the angle between the front and the temples becomes 75 degrees or more. Then, as shown in the circuit configuration diagram of FIG. 8, the switch-on signal from the power switch 34 is input to the sensor control unit 13, and the sensor control unit 13 turns on the power supply from the battery unit 20. The battery unit 20 is the power source for operating the first control board 10.

[0046]

On the other hand, as shown in FIG. 6(a), the power switch 34 turns off when the angle between the front and the temples becomes less than 75 degrees. Then, the switch-off signal from the power switch 34 is input to the sensor control unit 13, and the sensor control unit 13 disconnects the power supply from the battery unit 20. Therefore, because the power is only turned on when the eyeglass-type hearing aid is in use, the power consumption can be reduced.

[0047]

It should be noted that the angle between the front 31 and the temples 32 at which the power switch 34 turns on is not limited to 75 degrees; it can be set to, for example, 60 degrees or any other arbitrary angle.

[Embodiment 4]

[0048]

FIG. 7 shows the configuration for turning on the power of the eyeglass-type hearing aid according to Embodiment 4 of the present invention. The eyeglass-type hearing aid according to Embodiment 4 is an additional configuration to the eyeglass-type hearing aid according to Embodiment 1 shown in FIG. 1, with the configuration shown in FIG. 7 being added.

[0049]

As shown in FIG. 7, an electrostatic sensor 35 is provided on the temple portion of the left and right temples 32 (corresponding to the left and right frames 4a and 4b shown in FIG. 1) that corresponds to the position of the ear. When a person wears the eyeglass-type hearing aid, this electrostatic sensor 35 detects the person's capacitance and outputs a capacitance detection signal to the sensor control unit 13, as shown in FIG. 8. Upon receiving the

capacitance sensing signal, the sensor control unit 13 turns on the power supply consisting of the battery unit 20.
[0050]

On the other hand, the electrostatic sensor 35 does not detect the person's capacitance when the person removes the eyeglass-type hearing aid. Therefore, the sensor control unit 13 cuts off the power after a certain period of time has elapsed, for example, about 5 seconds, from the time it stops receiving a capacitance sensing signal. Therefore, because the power is only turned on when the eyeglass-type hearing aid is in use, the power consumption can be reduced.

[Embodiment 5]

[0051]

FIG. 9 shows the configuration for turning on the power of the eyeglass-type hearing aid according to Embodiment 5 of the present invention. The eyeglass-type hearing aid according to Embodiment 5 has the configuration of the eyeglass-type hearing aid according to Embodiment 1 shown in FIG. 1, with the addition of a microphone 36 to the temple 32 (corresponding to the left and right frames 4a and 4b shown in FIG. 1), as shown in FIG. 9.

[0052]

The microphone 36 senses a predetermined sound pressure and outputs a sound pressure sensing signal to the sensor control unit 13. When the sound pressure sensing signal is input from the microphone 36, the sensor control unit 13 switches the power supply consisting of the battery unit 20 from a standby state to a normal state.

[0053]

If the microphone 36 does not detect a predetermined sound pressure, the sound pressure detection signal from the microphone 36 is not output to the sensor control unit 13. Therefore, the sensor control unit 13 immediately switches the power supply consisting of the battery unit 20 from the normal state to the standby state. Consequently, because the power is only turned on when a predetermined sound pressure is detected, such as during a conversation, the power consumption can be reduced. Furthermore, people with hearing impairments and the elderly can converse without the need to turn on the power, thereby improving convenience.

[Embodiment 6]

[0054]

FIG. 10 shows the configuration of an eyeglass-type hearing aid according to Embodiment 6 of the present invention. The eyeglass-type hearing aid according to Embodiment 6 has the same configuration as the eyeglass-type hearing aid according to Embodiment 1 shown in FIG. 1, but further includes a cavity 37 that surrounds the speaker 8 within the temple 32 (corresponding to the left and right frames 4a and 4b shown in FIG. 1) as shown in FIG. 10. The cavity 37 is a space designed to optimally output sound from the speaker 8. Moreover, multiple holes 38 are formed extending from the cavity 37 toward the ear.

[0055]

With this configuration, the sound from the speaker 8 is optimally output through the cavity 37, and the sound from the cavity 37 is output directly towards the ear through the multiple holes 38, thereby reducing sound leakage. In addition, because sound energy is not dispersed, even quiet sounds can be easily heard, resulting in energy savings.

[Embodiment 7]

[0056]

FIG. 11 shows the configuration of an eyeglass-type hearing aid according to Embodiment 7 of the present invention. The eyeglass-type hearing aid according to Embodiment 7 is an additional configuration to the eyeglass-type hearing aid according to Embodiment 1 shown in FIG. 1, with the configuration shown in FIG. 11 being added.

[0057]

As shown in FIG. 11, a microphone 40 is provided on the temple portion of the left and right temples 32 (corresponding to the left and right frames 4a and 4b shown in FIG. 1) that corresponds to the position of the ear. This microphone 40 senses ambient sounds and outputs a sound detection signal to the sensor control unit 13.

[0058]

The sensor control unit 13 generates a sound detection signal that is in the opposite phase to the sound detection signal from the microphone 40, and outputs the generated inverse-phase sound detection signal to the speaker 8. The speaker 8 emits sound waves that are out of phase with respect to the ambient noise towards the ear canal. In other words, the out-of-phase sounds cancel each other out, creating a noise-free environment around the ear. As

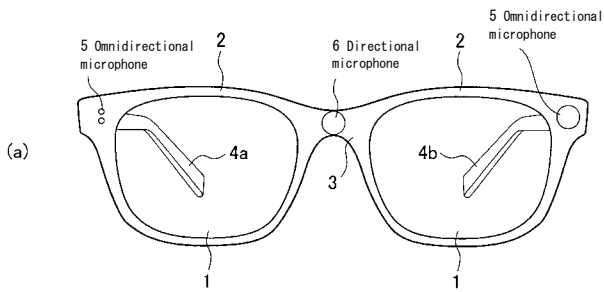
a result, people with hearing loss and the elderly can hear sounds clearly without being disturbed by the ambient noise.

[Reference Signs List]

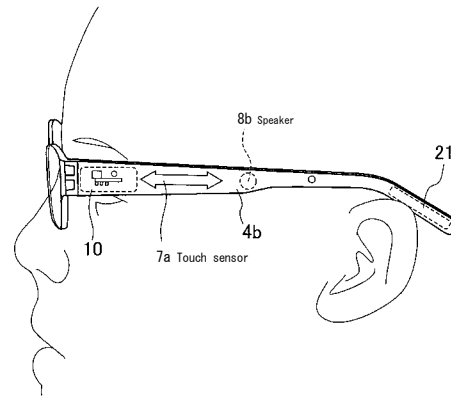
[0059]

1	Lens	
2	Eyeglass rim	
3	Eyeglass bridge	
4	Eyeglass frame	
5	Omnidirectional microphone	
6	Directional microphone	10
7a, 7b	Touch sensor	
8a, 8b	Speaker	
10	First control board	
11	Microphone control unit	
12	Amplifier	
12a	Band-pass filter (BPF)	
13	Sensor control unit	
14	Sound modulation unit	
15	Button	
20	Battery unit	20
21	Battery	
22	Contactless charging control unit	
31	Front	
32	Temple	
33	Hinge	
34	Power switch	
35	Electrostatic sensor	
36, 40	Microphone	
37	Cavity	
38	Hole	30

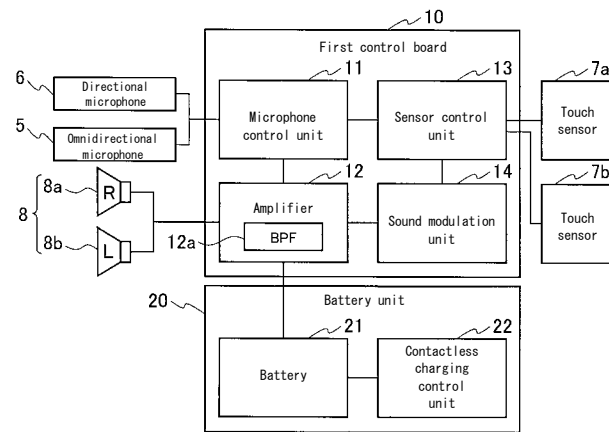
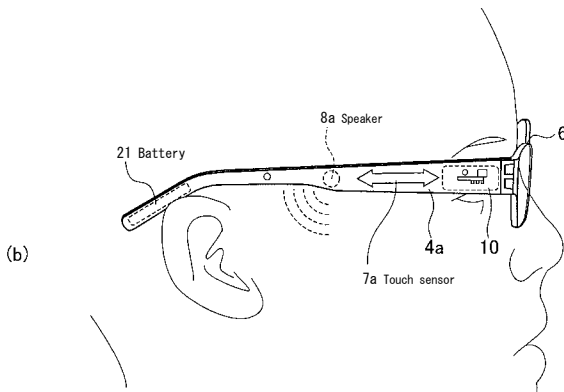
[FIG. 1]



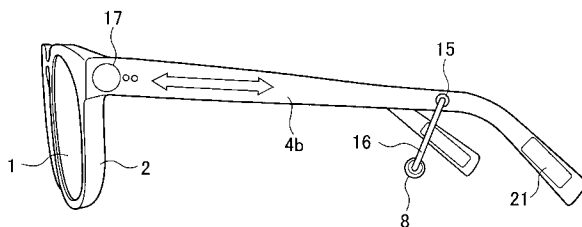
[FIG. 2]



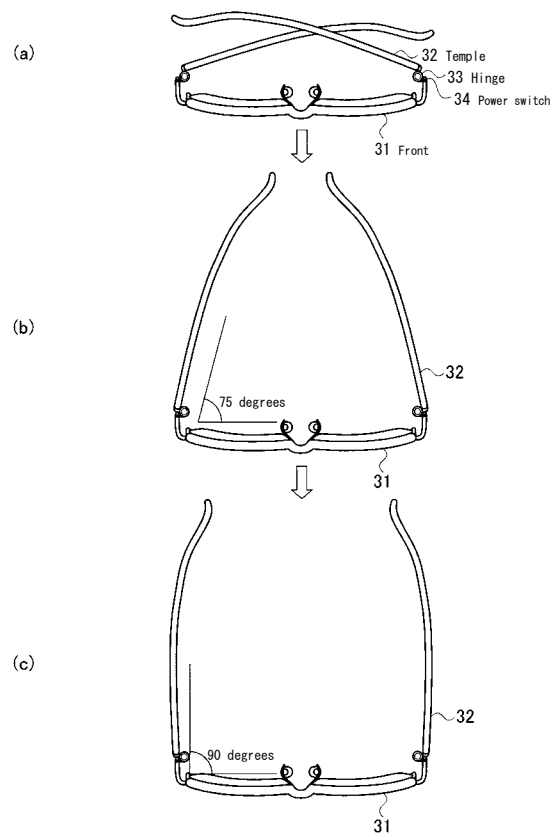
[FIG. 3]



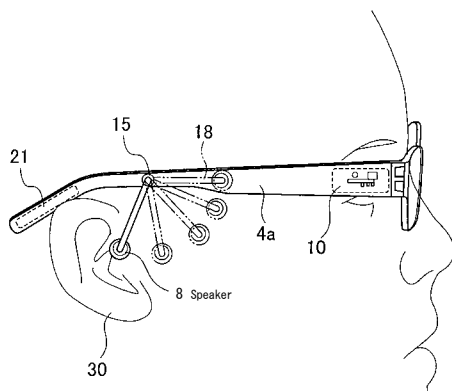
[FIG. 4]



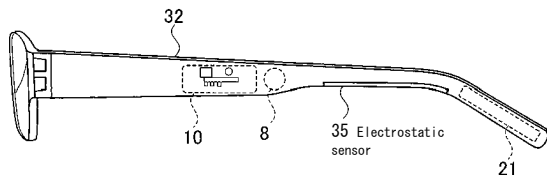
[FIG. 6]



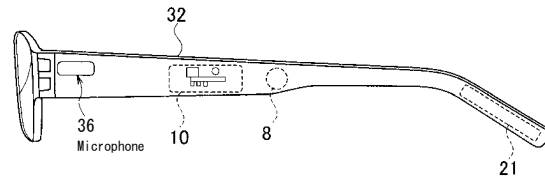
[FIG. 5]



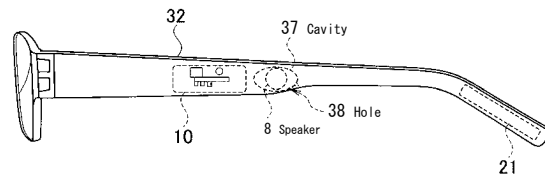
[FIG. 7]



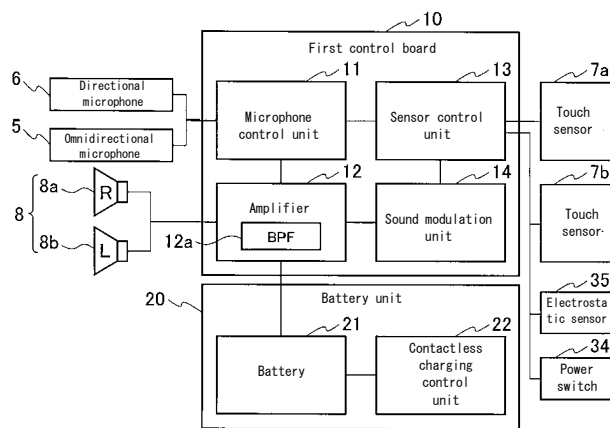
[FIG. 9]



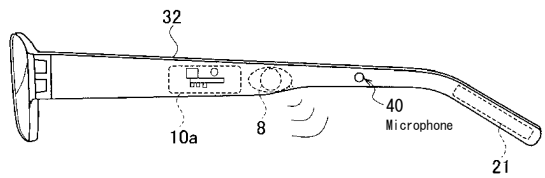
[FIG. 10]



[FIG. 8]



[FIG. 11]



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(72)	Toshiro Owada				
Inventor	1-19-25-104 Nakane, Soka-shi, Saitama-ken				
(72)	Fukuji Matsunari				
Inventor	1-28-8 Otaniguchi, Itabashi-ku, Tokyo				
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