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ENTRADA EN FASE NACIONAL

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54. **TITULO** DISPOSITIVO DE COMUNICACION PERSONAL DE MANOS LIBRES

51. **CLASIFICACION INTERNACIONAL**

71. **SOLICITANTE** KOSS CORPORATION

**DOMICILIO** MILWAUKEE, WI 53212-1052, ESTADOS UNIDOS DE AMERICA

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☒ Patente de Invención. ☐ Patente de Modelo de Utilidad.

☒ Capítulo I. ☐ Capítulo II.

| | | |
|---|---|---|
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2

**10** **ANEXOS**

- [x] Comprobante de pago de la tasa de presentación de la solicitud. $463.000
- [ ] Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- [ ] Poderes, si fuere el caso
- [ ] Documento de cesión del inventor al solicitante o a su causante.
- [ ] Declaraciones.
- [x] Copia de la solicitud internacional. (Resumen, descripción, reivindicaciones, dibujos)
- [x] Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- [ ] Copia del examen preliminar efectuado por la IPEA
- [ ] Traducción del examen preliminar efectuado por la IPEA
- [ ] De ser el caso, copia del contrato de acceso.
- [ ] De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- [ ] De ser el caso, certificado de depósito del material biológico.
- [ ] Arte final 12x12
- [ ] De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- [x] Otros Tarjeta de Propietarios

**11** **FIGURA CARACTERÍSTICA:**

**12** **Solicito la concesión de la patente,**

**NOMBRE:** **JUAN PABLO CADENA SARMIENTO**

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DOMICILIO MILWAUKEE, WI 53212-1052, ESTADOS UNIDOS DE AMERICA

APODERADO JUAN PABLO CADENA SARMIENTO

TITULO DISPOSITIVO DE COMUNICACION PERSONAL DE MANOS LIBRES

CLASIFICACION

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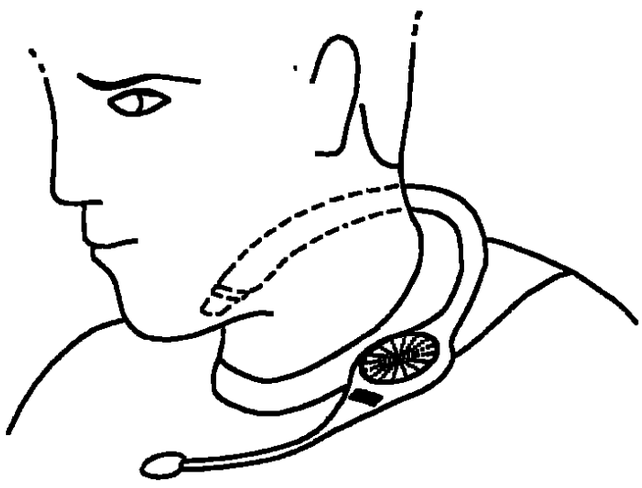
(54) Title: HANDS-FREE PERSONAL COMMUNICATION DEVICE



(57) Abstract: A hands-free personal communication device is worn about a user's neck. The communication device includes an elongated elastic neckband for supporting the communication device about the user's neck. The elastic neckband has memory characteristic and is bendable along its length such that the neckband is formable into and out of various selectable positions. An acoustic output device is attached to the neckband and positioned near an ear of the user when the communication device is worn about the user's neck. A microphone is attached to an end of the neckband. A detachable earbud may be attached to an end of the neckband.

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# HANDS-FREE PERSONAL COMMUNICATION DEVICE

## FIELD OF THE INVENTION

[0001] The present invention relates to the field of hands-free personal communication devices. More specifically, the present invention relates to a hands-free personal communication device that is worn about a user's neck.

## BACKGROUND OF THE INVENTION

[0002] Hands-free personal communication devices are used in a variety of known professional and personal settings. In general, hands-free personal communication devices are useful for any application wherein it is desired to provide one-way or two-way communication while leaving the users' hands free to perform various other tasks. Hands-free personal communication devices are used by, for example, telephone operators and multimedia users who receive and/or send communications using the device and at the same time, use both hands for other tasks.

[0003] Headsets are a well-known example of hands-free personal communication devices. Headsets are typically worn on the user's head and have opposing speakers, one for each ear of the user, attached by a headband which extends over the top of the user's head. These devices may also include a boom which has one end attached to the headband and a second end that contains a microphone. The boom is often flexible and contains memory characteristic such that the boom is positionable into and out of various selectable positions.

[0004] A significant drawback to known headsets is that they are often uncomfortable to wear and can become entangled with or mess up the user's hair. Known headsets are also not as adjustable as is often desired and are typically rigid such that they do not fit a wide range of users having different body proportions. Because most headsets are arranged to be in constant contact with the user's ears and/or head, many users complain of head and/or ear discomfort.

[0005] U.S. Patent Application No. 10/218,277 by the present inventor Christopher Gantz, the disclosure of which is incorporated herein by reference, discloses a personal wearable communication and speaker system that is wearable about a user's neck. The communication and speaker system includes a gripping neckband attached to a speaker housing and an adjustable microphone support arm. The gripping neckband is rotatable about an axis by 180° to convert from a left-eared configuration to a right-eared configuration, and vice versa. A pad is attached to the distal end of the gripping neckband relative to the speaker housing. In a particular embodiment, the speaker housing can be disengaged from its base and automatically switched to a headphone mode wherein the speaker is mounted on the user's ear.

[0006] The above described patent application solves many of the above described problems with known headsets. However, further improvements upon this device are still desired. For example, it is desirable to provide an improved device that is more easily adjusted to fit a wide variety of body types and sizes. It is further desirable to provide a device that is more easily adjusted between headphone and ear phone use.

[0007] As such, it is desirable to provide an improved hands-free personal communication device that overcomes the shortcomings of known devices. It is desirable to provide a communication device that is self-supporting and adjustable to fit individuals having different body proportions. It is desirable to provide such a communication device that is easy to put on and take off. It is desirable to provide a hands-free communication device which is adjustable to fit either a left or right side of the user. It is desirable to provide such a device that eliminates head and ear discomfort often associated with many known headsets. It is further desirable to provide such a communication device that maintains or improves the acoustic output and input quality and performance of current known devices.

## SUMMARY OF THE INVENTION

[0008] The present invention is a hands-free personal communication device that overcomes many shortcomings of known devices.

[0009] The hands-free personal communication device includes an elongated elastic neckband which supports the communication device about the user's neck. The neckband has memory characteristic and is bendable along its length, or at least part of its length, such that the neckband is positionable into and out of various selectable positions. An acoustic output device is attached to the neckband and positioned near an ear of the user when the communication device is worn about the user's neck. A microphone is attached to a first end of an elastic boom attached to the neckband.

[0010] The hands-free personal communication device may also include an earphone or earbud attached, for example, to the second end of the neckband. The earphone is detachable from the neckband such that the earphone is insertable into an ear of the user when the communication device is worn about the user's neck. An electrical connection provides communication to and from the earphone and microphone.

[0011] The hands-free personal communication device of the present invention may be easily adjusted and fitted so as to be worn comfortably and in firm and stable fashion around the neck, just at or above the shoulders, of a user. It has the advantage of not being in direct contact with the more sensitive areas of the body, such as the ear and head or scalp. The present invention

includes an ergonomic alternative to a traditional headset or earset. The device of the present invention places a speaker and microphone combination on or near the intersection of the user's neck and shoulder, thereby eliminating the need for any sort of contact with or mounting to the user's head or ear. The freedom of movement and rotation provided by the elastic and memory characteristics of the neckband provide significant advantages where mobility, stability and comfortable fit are desired.

[0012] Furthermore, one embodiment of the present invention allows the user to place a detachable earbud in the user's ear, if desired. By this arrangement, the user can easily disengage the earbud from the elastic neckband and insert it into the user's ear for more private conversations. In addition, the hands-free personal communication device can include a switch and/or a control module to change the output of the device from loudspeaker mode to headphone mode in order to eliminate the need to control the volume when the user temporarily (for momentary privacy concerns, for example) places the earbud into the user's ear. The switch may be manual or the device may be configured to automatically switch to headphone mode when the earbud is utilized.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The drawings illustrate the best mode presently contemplated of carrying out the invention.

[0014] In the drawings:

[0015] Fig. 1 is a perspective view of the hands-free personal communication device worn about a user's neck;

[0016] Fig. 2 is a top view of a first embodiment of the hands-free personal communication device;

[0017] Fig. 3 is a top view of the hands-free personal communication device shown in Fig. 2, wherein the earbud is removed;

[0018] Fig. 4 is a top view of the device, depicting the memory characteristic and bendability of the elongated elastic neckband;

[0019] Fig. 5 is a side view of the hands-free personal communication device;

[0020] Fig. 6 is a detailed view of the control module;

[0021] Fig. 7 is a detailed sectional side view of the hands-free personal communication device;

[0022] Fig. 8 is a sectional top view of the audio component;

[0023] Fig. 9 is a top view of an alternate embodiment of the hands-free personal communication device;

[0024] Fig. 10 is a perspective view of an alternate embodiment of the hands-free personal communication device worn about a user's neck; and

[0025] Fig. 11 is a top view of an alternate embodiment of the hands-free personal communication device.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] In the preferred embodiments of the present invention described in detail below, a hands-free personal communication device is provided. It should be understood that the drawings and specification are to be considered an exemplification of the principles of the invention, which is more particularly defined in the appended claims.

[0027] Referring to Figs. 1 and 2, a preferred embodiment of the hands-free personal communication device is shown. A neckset 15 includes an elongated elastic neckband 17 for supporting the neckset 15 about a user's neck. The elastic neckband 17 is bendable and/or twistable along at least part of its length and has memory characteristic such that when the neckband 17 is moved into a certain position it retains that position. In this manner, the shape and position of the neckband 17 can be changed such that it comfortably fits around a user's neck. This also allows the various audio components carried by the neckband 17 (which are described in more detail below) to be positioned in a location where they will not interfere with, for example, a user's chin or mouth. As shown in Fig. 1, the neckband 17 is worn around the user's neck 16 and rests on either the user's shoulders 14, or on the area where the shoulders 14 meet the neck 16. Because the neckband 17 is bendable and/or twistable along its length and has memory characteristics, it can be shaped to properly fit around the user's individual physique such that it has stability and is comfortable to wear.

[0028] Referring now to Figs. 1, 2, 7 and 8, in a particular embodiment, the elastic neckband 17 includes a bendable wire 20 or metal tube and a flexible rubber coating 22, preferably comprising a thermo plastic elastomer. However, it should be recognized that the elastic neckband 17 may comprise any one of a variety of known materials that are flexible and have memory characteristics such that the neckband 17 is positionable into and out of a variety of positions along its entire length, or alternately along a portion thereof.

[0029] An acoustic output device or speaker 19 is integrally attached to the elastic neckband 17 and resides within a speaker housing 31. The speaker 19 receives audio and electrical input from speaker audio/power cord 21 and may comprise any one of a variety of audio speakers known in the art. The speaker 19 however should be capable of providing sufficient audio output such that a user may hear the audio output when the neckset 15 is worn about the

user's neck and the speaker housing is resting on the user's shoulder, as will be described further below, and as is shown in Fig. 1. The audio output of the speaker 19 is controllable by a volume control, which in the embodiment shown is a rotary member 18.

[0030] Referring to Figs. 1 and 2, a speaker screen 30 covers the speaker 19 and protects the speaker 19 from damage. Speaker screen 30 is preferably made of metal and includes a series of holes 28 which allow audio from the speaker 19 to pass through the speaker screen 30.

[0031] Audio/power cord 21 provides audio and electrical signals to the neckset 15 and includes a 2.5 millimeter plug that is connected to the speaker housing 31 by a strain relief (not shown). Strain relief provides strength and durability to the connection and is preferably formed of a notched cone-shaped rubber piece that provides a flexible and durable connection. It will also be recognized by those skilled in the art that the neckband 17 may include a wireless transmitter instead of the audio/power cord 21. Such an arrangement would also include a separate power source, such as for example a battery, for powering the various audio components provided with the device.

[0032] As shown in Figs. 1, 2 and 7, the neckset 15 further includes a bendable boom arm 23 having a microphone 25 attached to its distal end 27 relative to the speaker 19. The bendable boom arm 23 is preferably constructed of bendable material such as wire, a flexible memory plastic, or metal tube 20 and a flexible rubber coating 22, preferably including a thermal plastic polymer. The boom arm 23 is positionable into and out of a variety of positions along its entire length, or a portion thereof. The microphone 25 is attached to the end of the boom arm 23 and consists of any one of a variety of known microphones for receiving sound from an external source. The microphone 25 is encased by a foam covering 26 to protect the microphone 25 from wind noise and yet still allow for audio pickup. The boom arm 23 is thus positionable such that it can be easily moved to various positions and will stay where it is moved. This allows the microphone 25 to be positioned in a location where it will not interfere with the user's mouth or chin, and yet allows the microphone 25 to be moved close to the user when the user wants to speak softly and still be heard.

[0033] Referring now to Figs. 3 and 7, the illustrated embodiment of the neckset 15 includes a detachable earphone, which is often referred to in the art as an earbud 47. The earbud 47 is releaseably attached to the distal end 49 of the elastic neckband 17. The earbud 47 is detachable from the elastic neckband 17 and yet remains connected to the elastic neckband 17 by a retractable power/audio cord 51. According to this arrangement, the earbud 47 is easily removed from the elastic neckband 17 and reattached to the elastic neckband 17. In the embodiment shown, retractable power/audio cord 51 resides within an open-faced cavity 54.

[0034] The earbud 47 and neckset 15 may alternately include wireless transmitters and the earbud 47 may include a power source. In such an arrangement, the power/audio cord 51 would not be necessary, as the earbud 47 would be capable of wirelessly transmitting with the neckset 15. The earbud 47 provides many advantages that will be recognized by one skilled in the art. The earbud 47 provides privacy to one using the neckset 15. The earbud 47 also increases the ability of the user to hear the audio output as compared to the speaker 19. This is particularly true if the neckset 15 is used in a crowded and/or noisy environment.

[0035] Referring to Fig. 7, the distal end 49 of the elastic neckband 17 defines an open-ended cavity 54 for releaseably receiving and retaining the earbud 47. According to this arrangement, the side portions 44 of the open-ended cavity 54 are flexible such that the earbud 47 is easily inserted into and removed from the cavity 54 on the elastic neckband 17. In the embodiment shown, the earbud 47 has an outwardly protruding collar 48 that is sized and shaped to be received in a snap-fit arrangement by an annular groove 52 on the interior of the cavity 54, to thereby securely and releasably retain the earbud 47 in the cavity 54. Various other releasable connections may be employed, such as for example an arrangement where the earbud 47 is sized and shaped to be press-fit into the cavity 54.

[0036] In the embodiment shown, retractable power/audio cord 51 resides within the open-ended cavity 54, in such a manner that easy retraction and deployment of the power/audio cord 51 and earbud 47 are possible. In Fig. 7, the power/audio cord is shown in its retracted state as the earbud 47 is nested in the open-ended cavity 54. The power/audio cord 51 is attached to the earbud 47 by a strain relief 53, which provides strength and durability to the connection and is preferably formed of a notched cone-shaped rubber piece and provides a flexible and durable connection.

[0037] In use, the earbud 47 is detached from the neckset 15 and inserted into a user's ear, thus providing audio to the user. Removal of the earbud 47 from the neckset 15 may automatically cause the speaker 19 to stop producing audio, or alternatively, the earbud 47 and speaker 19 may be controlled by a control module 41 (shown in Fig. 6). The control module 41 is arranged to control the volume of speaker 19. More specifically, the control module 41 includes volume control, which, in the embodiment shown, is a manually operable rolling member 43. In addition, the control module 41 may include an on/off switch 45 for selectively providing electrical power to the neckset 15, including the speaker 19 and microphone 25. The control module 41 preferably further includes an amplifier (not shown) for electrically driving the audio input to speaker 19 and from microphone 25. The module 41 may further include means from providing power to the neckset 15, such as for example a battery.

[0038] Referring to Fig. 4, the neckset 15 is adjustable such that the speaker 19 may be positioned on either a left or right ear of the user. As shown by arrow 35, the elastic neckband 17 is adjustable 180 degrees about axis 36 such that the left 37 and right 39 configurations are possible. In addition to the configurations shown, the elastic neckband 17 is positionable such that the neckband 17 is sized to fit the individual user's physique. For example, if the user's neck is wide, the neckband 17 is positioned such that the speaker 19 and earbud 47 are further apart.

[0039] Referring to Fig. 5, the a side view of the neckset 15 is shown.

[0040] The elastic neckband 17 may be provided with a neck brace 56 which can include a curved piece of flexible or stiff rubber (see Fig. 9) or plastic or soft foam sleeve (see Fig. 11). The neck brace 56 provides additional stability and form to the neckband 17 and assists the neckband 17 to fit properly around the user's neck.

[0041] Referring to Fig. 9, an additional embodiment of the neckset 15 includes an open-faced cavity 57, which is open along the distal end 49 of the neckband 17. The open-faced cavity 57 advantageously allows the power/audio cord 51 to extend in a direction transverse to the distal end 49 of the elongated neckband 17 when the earbud 47 is inserted in the user's ear.

[0042] In the particular arrangement shown in Fig. 9, the earbud 47 includes an elongated tapered member 59 that is sized slightly smaller than the width of the open-faced cavity 54. In this arrangement, the elongated tapered member 59 is press-fit into the open-faced cavity 54 to releaseably secure the earbud 47 to the distal end 49 of the neckband 17.

[0043] Referring to Fig. 10, it is further recognized that the distal end 49 of the neckband 17 may include an additional fixed speaker 55 in addition to or rather than the earbud 47. In such an arrangement, speakers 19, 55 are disposed on either side of the user's head and provide binaural sound to the user.

[0044] Referring to Fig. 11, an arrangement is shown wherein the distal end 49 of the neckband 17 includes a closed-ended open-faced cavity 61. In this arrangement, the earbud 47 is sized and shaped to fit within the closed-ended open-faced cavity 61 in a press fit manner, to releaseably attach the earbud 47 to the distal end 49 of the neckband 17.

[0045] It is recognized that the neckset 15 is useable in a variety of environments. As such, the speakers 19, 55, the earbud 47, and the microphone 25 may be designed such that they are waterproof. Referring briefly to Fig. 7, water repellant paper (not shown) may be provided on the microphone 25 to protect the microphone 25 from damage caused by moisture or water. In addition, the speaker housing 31 may include water repellant paper (not shown) which is preferably positioned on the top and bottom of the speaker 19 and/or inside the speaker screen 30

and the lower portion of the speaker housing 31. The water repellant paper prevents water from entering the speaker housing 31 and damaging the speaker 19.

[0046] It is also recognized that an embodiment of the neckset 15 may not include the earbud 47. In such an arrangement, the distal end 49 of the neckband 17 would form a weighted bud which offsets the weight of the speaker 19, boom arm 23 and microphone 25 when the neckset 15 is worn about the user's neck.

[0047] While this invention is susceptible to embodiments in many different forms, the drawings and specification describe in detail a preferred embodiment of the invention. They are not intended to limit the broad aspects of the invention to the embodiment illustrated.

# CLAIMS

What is claimed is:

1. A hands-free personal communication device for wearing about a user's neck, the communication device comprising:

an elongated elastic neckband for supporting the communication device about the user's neck, the neckband having memory characteristic and being bendable along its length such that the neckband is formable into and out of various selectable positions;

an acoustic output device attached to the neckband and positionable near an ear of the user when the communication device is worn about the user's neck; and

a microphone attached to a first end of the neckband.

2. The hands-free personal communication device of claim 1, further comprising an earphone attached to a second end of the neckband, the earphone being detachable from the neckband such that the earphone is insertable into an ear of the user when the communication device is worn about the user's neck.

3. The hands-free personal communications device of claim 2, further comprising an electrical connection between the earphone and the communication device.

4. The hands-free personal communication device of claim 1, further comprising a battery.

5. The hands-free personal communication device of claim 1, further comprising a wired electrical connection.

6. The hands-free personal communication device of claim 1, further comprising a wireless electrical connection.

7. The hands-free personal communication device of claim 1, further comprising an earphone attached to a second end of the neckband.

8. The hands-free personal communication device of claim 7, wherein the earphone is detachable from the neckband and insertable into an ear of the user when the communication device is worn about the user's neck.

9. The hands-free personal communication device of claim 1, wherein the elastic neckband comprises a bendable wire and a flexible rubber coating.

10. The hands-free personal communication device of claim 1, further comprising a weighted boom attached to a second end of the neckband, the weighted boom of sufficient weight to offset the acoustic output device and microphone when the device is worn about the user's neck.

11. The hands-free personal communication device of claim 1, further comprising means for controlling the volume of the acoustic output device.

12. The hands-free personal communication device of claim 1, wherein the acoustic output device comprises an audio speaker.

13. The hands-free personal communication device of claim 8, wherein the neckband comprises a cavity that facilitates retraction and deployment of an electrical wire connected to the earphone.

14. The hands-free personal communication device of claim 1, further comprising a second acoustic output device attached to the neckband and positionable near another ear of the user.

15. The hands-free personal communication device of claim 1, further comprising a neck brace attached to the neckband to provide additional stability to the neckband.

16. The hands-free personal communication device of claim 1, wherein the acoustic output device is waterproof.

17. The hands-free personal communication device of claim 1, wherein the microphone is waterproof.

18. A hands-free personal communication device for wearing about a user's neck, the communication device comprising:

an elongated elastic neckband for supporting the communication device about the user's neck;

an acoustic output device attached to the elongated elastic neckband and positionable near an ear of the user when the communication device is worn about the user's neck; and

an earphone attached to an end of the neckband, the earphone being detachable from the neckband and insertable into an ear of the user when the communication device is worn about the user's neck.

19. The hands-free personal communication device of claim 4 wherein the earphone is removably attached to the communication device by an electrical cord having memory characteristic.

20. The hands-free personal communication device of claim 18, further comprising an electrical connection between the earphone and the communication device.

21. The hands-free personal communication device of claim 18, further comprising a battery.

22. The hands-free personal communication device of claim 18, further comprising a wired electrical connection.

23. The hands-free personal communication device of claim 18, further comprising a wireless electrical connection.

24. The hands-free personal communication device of claim 18, wherein the elastic neckband comprises a bendable wire and a flexible rubber coating.

25. The hands-free personal communication device of claim 18, further comprising a weighted boom attached to a second end of the neckband, the weighted boom of sufficient weight to offset the acoustic output device and microphone when the device is worn about the user's neck.

26. The hands-free personal communication device of claim 18, further comprising means for controlling the volume of the acoustic output device.

27. The hands-free personal communication device of claim 18, wherein the acoustic output device comprises an audio speaker.

28. The hands-free personal communication device of claim 18, wherein the neckband comprises a cavity that facilitates retraction and deployment of an electrical wire connected to the earphone.

29. The hands-free personal communication device of claim 18, further comprising a second acoustic output device attached to the neckband and positionable near another ear of the user.

30. The hands-free personal communication device of claim 1, further comprising a neck brace attached to the neckband to provide additional stability to the neckband.

31. The hands-free personal communication device of claim 18, wherein the acoustic output device is waterproof.

32. The hands-free communication device of claim 18, wherein the microphone is waterproof.

33. A hands-free personal communication device for wearing about a user's neck, the communication device comprising:

an elongated neckband for supporting the communication device about the user's neck, the neckband having memory characteristic and being bendable along its length such that the neckband is formable into and out of various selectable positions;

an acoustic output device attached to the neckband and positionable near an ear of the user when the communication device is worn about the user's neck;

a microphone attached to a first end of the neckband;

an earphone attached to an end of the neckband, the earphone being detachable from the neckband and insertable into an ear of the user when the communication device is worn about the user's neck; and

a neck brace attached to the neckband to provide additional stability to the neckband.

FIG. 1

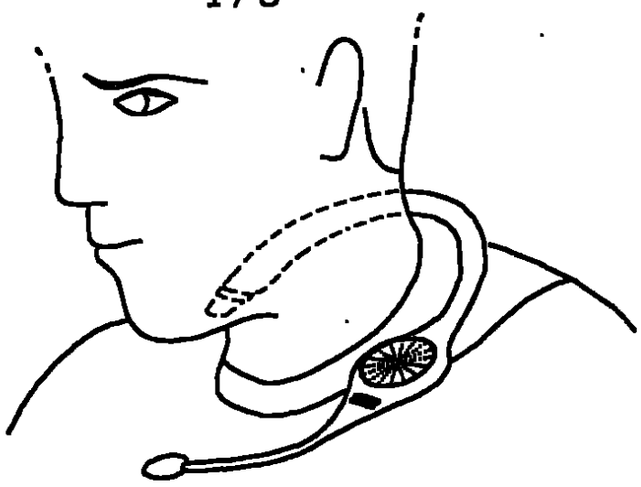
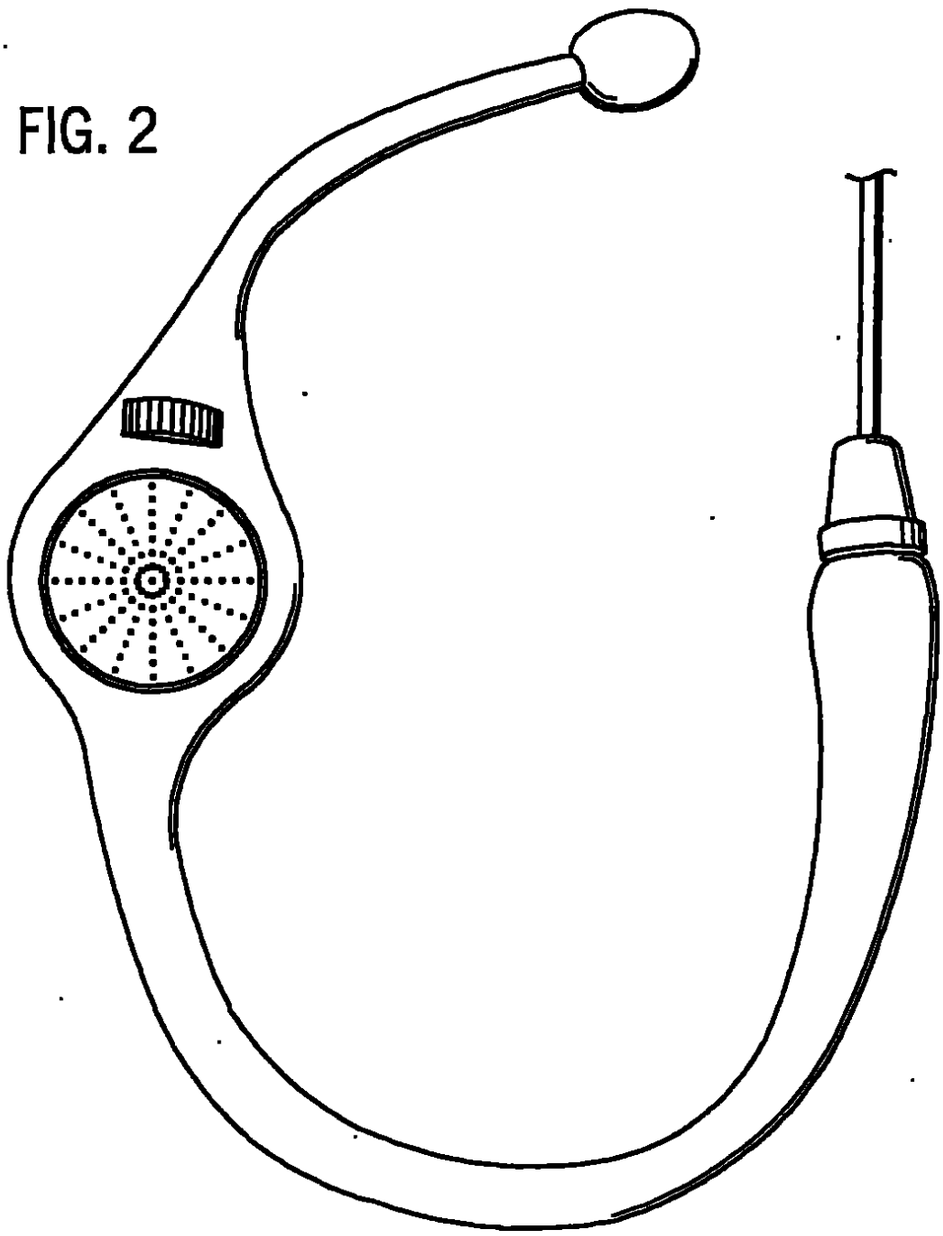


FIG. 2



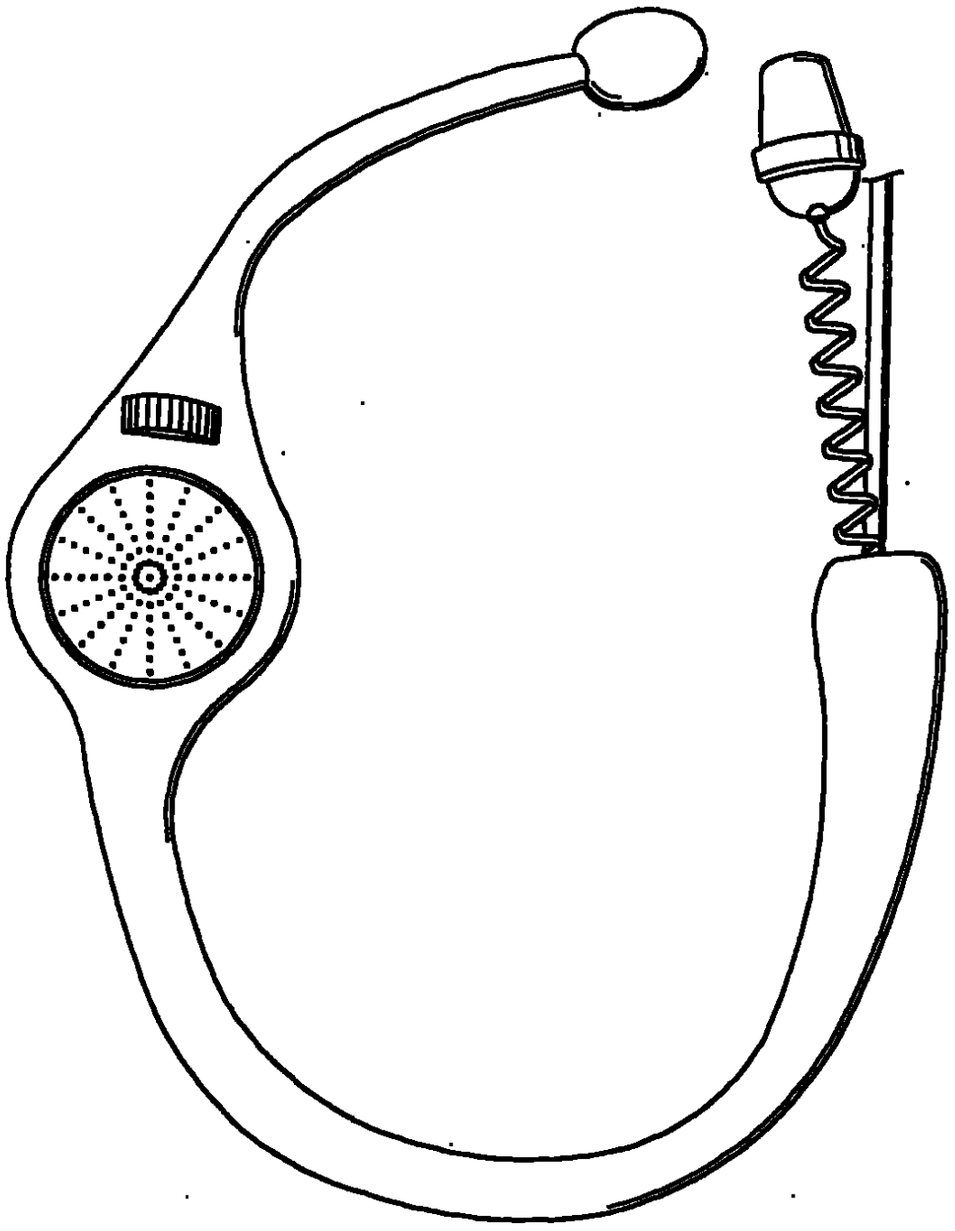


FIG. 3

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FIG. 4

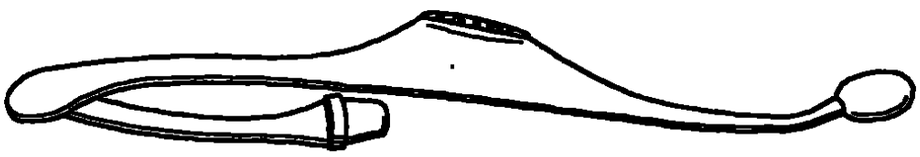
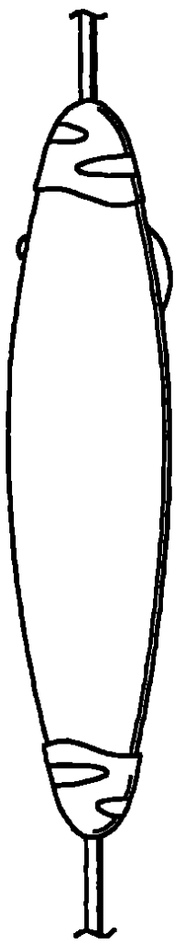


FIG. 5

FIG. 6



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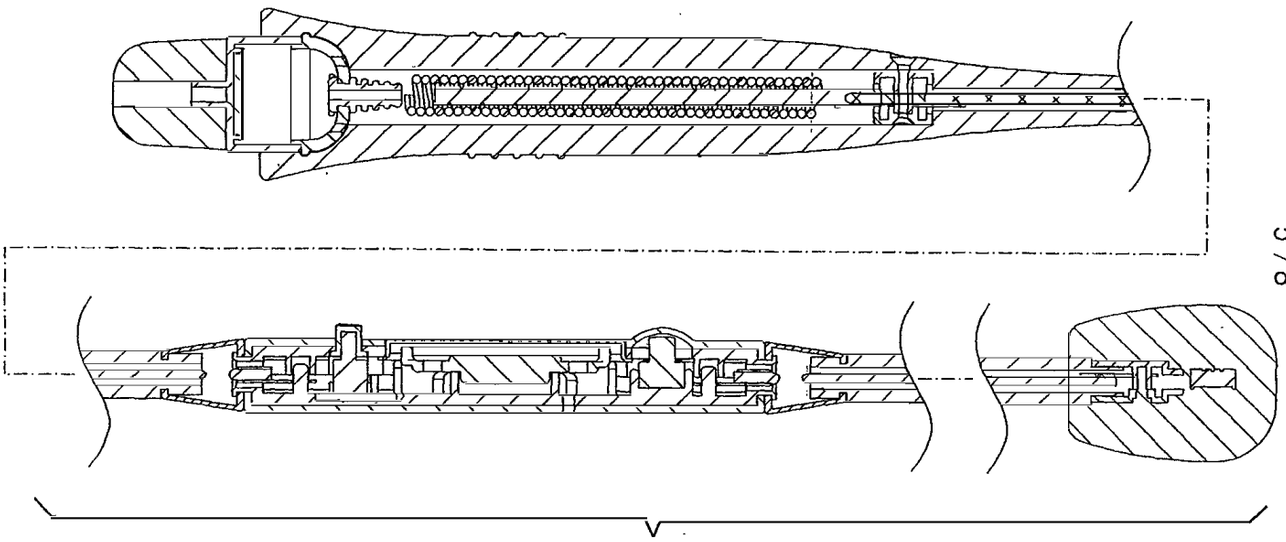

FIG. 7

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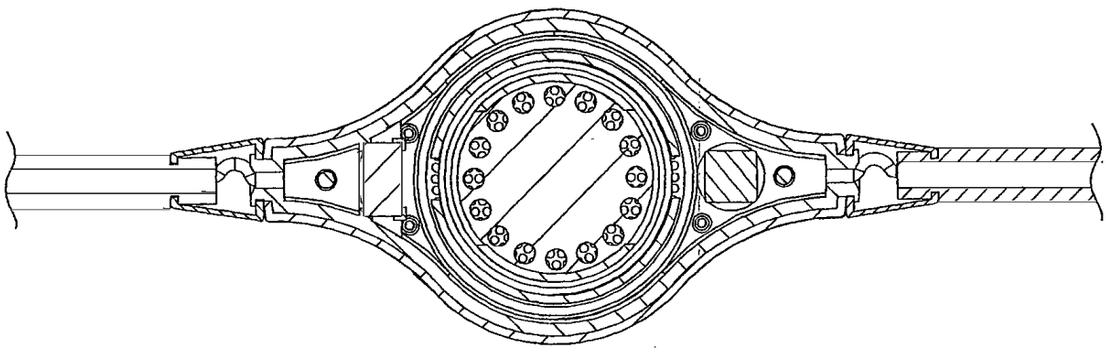



FIG. 8

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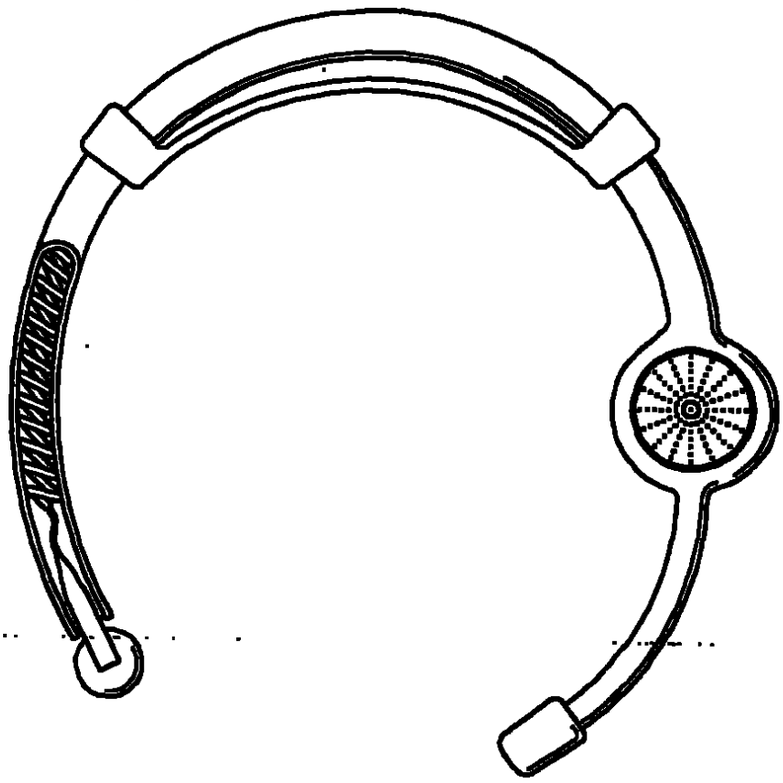
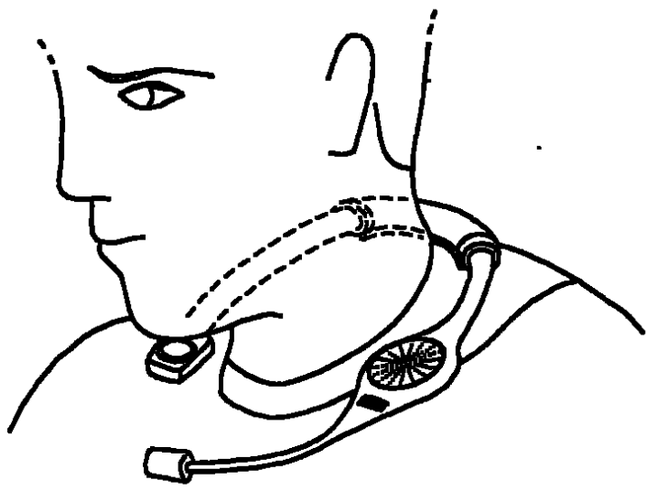


FIG. 9

FIG. 10



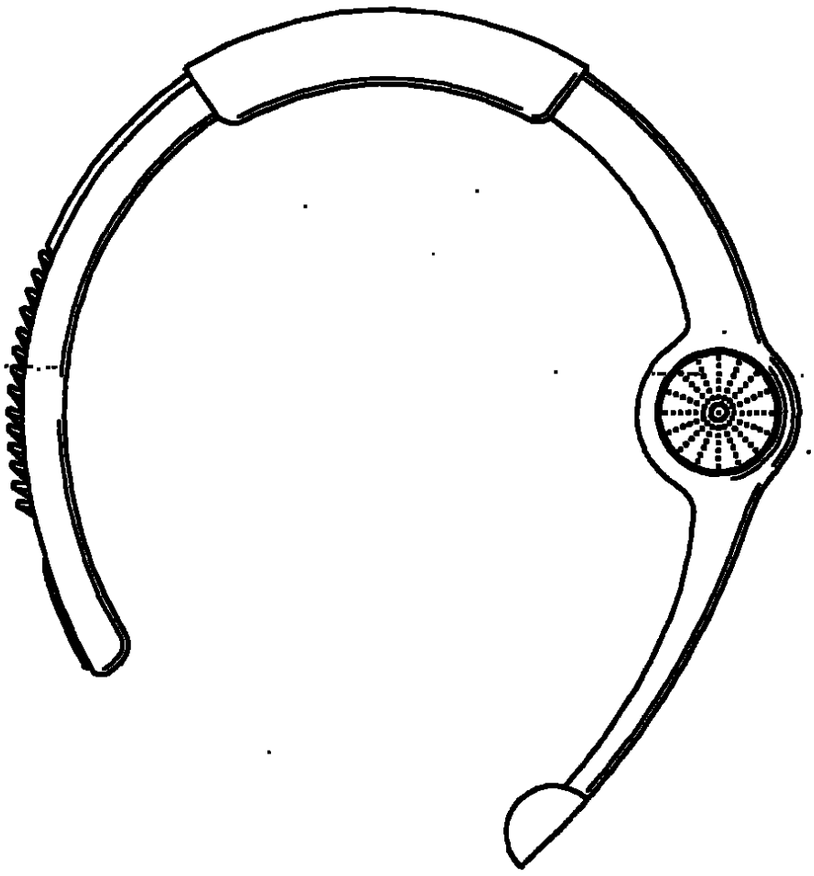


FIG. 11

# INTERNATIONAL SEARCH REPORT

Intern Application No
PCT/US2005/000297

21

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/05 H04M1/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No |
|---|---|---|
| X | US 2002/173346 A1 (WANG CHIN-YANG)<br>21 November 2002 (2002-11-21)<br><br>abstract<br>paragraphs '0007!, '0012! - '0015!<br>figures 1,2 | 1-12,15,<br>18-27,<br>30,33 |
| A | | 13,14,<br>28,29 |
| A | US 5 457 751 A (SUCH ET AL)<br>10 October 1995 (1995-10-10)<br>abstract | 1,33 |
| A | US 6 519 345 B1 (YANG CHIN-HUI)<br>11 February 2003 (2003-02-11)<br>abstract<br>figures 2,6 | 2,3,7,<br>18,20,33 |

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

'O' document referring to an oral disclosure, use, exhibition or other means

'P' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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'&' document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 15 April 2005 | 26/04/2005 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel (+31-70) 340-2040, Tx 31 651 epo nl,<br>Fax (+31-70) 340-3016 | Pohl, M |

Form PCT/ISA/210 (second sheet) (January 2004)

# INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/US2005/000297

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | WO 03/055183 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD; FUNAYAMA, TOSHIYUKI; ITO, MAM) 3 July 2003 (2003-07-03) abstract | 6,11,23, 26 |
| A | US 6 018 585 A (AKINO ET AL) 25 January 2000 (2000-01-25) abstract page 1, lines 15,19,20 | 16,17, 31,32 |
| A | EP 1 223 682 A (TELEFONAKTIEBOLAGET L M ERICSSON) 17 July 2002 (2002-07-17) abstract paragraphs '0009! - '0019!; figures 1-4 | 1-33 |

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

22

# INTERNATI NAL SEARCH REPORT

In tional application No.
PCT/US2005/000297

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17,33

A hands-free personal communication device for wearing about a user's neck, comprising an elongated elastic neckband having memory characteristic, an acoustic output device and a microphone.

1.1. claims: 18-32

A hands-free personal communication device for wearing about a user's neck, comprising an elongated elastic neckband, an acoustic output device and an earphone.

# INTERNATIONAL SEARCH REPORT

mation on patent family members

Interr al Application No
PCT/US2005/000297

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 2002173346 A1 | 21-11-2002 | TW 496645 Y<br>DE 20110379 U1 | 21-07-2002<br>04-10-2001 |
| US 5457751 A | 10-10-1995 | NONE | |
| US 6519345 B1 | 11-02-2003 | DE 20014762 U1 | 07-12-2000 |
| WO 03055183 A | 03-07-2003 | JP 2003188985 A<br>WO 03055183 A1 | 04-07-2003<br>03-07-2003 |
| US 6018585 A | 25-01-2000 | JP 9205693 A | 05-08-1997 |
| EP 1223682 A | 17-07-2002 | EP 1223682 A1<br>AT 250828 T<br>DE 60005543 D1 | 17-07-2002<br>15-10-2003<br>30-10-2003 |

(12) SOLICITUD INTERNACIONAL PUBLICADA BAJO EL TRATADO DE COOPERACIÓN DE PATENTES (PCT)

(19) Organización Mundial de Propiedad Intelectual
Oficina Internacional

(43) Fecha de Publicación Internacional
4 de agosto de 2005 (4.08.2005)

PCT

(10) Número de Publicación Internacional
WO 2005/071929 A1

(51) Clasificación Internacional de Patentes: H01M 1/05, 1/60

(21) Numero de Solicitud Internacional:
PCT/US2005/000297

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6 de enero de 2005 (06.01.2005)

(25) Lenguaje de entrega: Inglés

(26) Lenguaje de Publicación: Inglés

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60/535,314 9 de enero de 2004 (09.01.2004) US
11/029,911 5 de enero de 2005 (05.01.2005) US

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(74) Agente: JOCHMAN, Joseph, J.; Andrus, Sceales, Starke & Sawall, LLP, 100 East Wisconsin Avenue, Suite 1100, Milwaukee, WI 53202 (US)

(81) Estados Designados (*a menos que se indique lo contrario, para todo tipo de protección nacional disponible*):AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HY, ID, IL, IN ,IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MAMD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UAM UG, UZ, VN, YU, ZA, ZM, ZW.

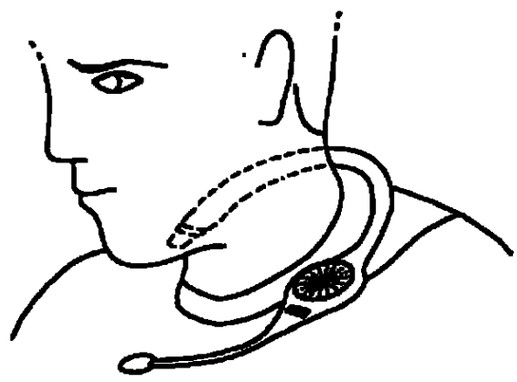
(84) Estados Designados (*a menos que se indique lo contrario, para todo tipo de protección regional disponible*): ARIPO (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Euroasiática (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Europea (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Publicado:**

—— *con el informe de búsqueda internacional*

*Para códigos de dos letras y otras abreviaciones, referirse a las "Notas de guía sobre Códigos y Abreviaturas" que aparecen al comienzo de cada edición de la Gaceta del PCT*

(54) Título: DISPOSITIVO DE COMUNICACION PERSONAL DE MANOS LIBRES



(57) Resumen: Un dispositivo de comunicación personal de manos libres se lleva alrededor del cuello del usuario. El dispositivo de comunicación incluye una banda para el cuello elástica para soportar el dispositivo de comunicación alrededor del cuello del usuario. La banda para el cuello elástica tiene características de memoria y es plegable a lo largo de su longitud tal que se puede formar en y fuera de varias posiciones elegibles. Un dispositivo de salida acústico se encuentra unido a la banda para el cuello y ubicado cerca de un oído del usuario cuando el dispositivo de comunicación se lleva alrededor del cuello del usuario. Un micrófono esta unido a un extremo de la banda para el cuello. Un audífono desprendible puede estar unido a un extremo de la banda para el cuello.

# DISPOSITIVO DE COMUNICACIÓN PERSONAL DE MANOS LIBRES

## CAMPO DE LA INVENCION

**[0001]** La presente invención se relaciona con el campo de los dispositivos de comunicación personal de manos libres. Más específicamente, la presente invención se relaciona con un dispositivo de comunicación personal que es utilizado por el usuario alrededor del cuello.

## ANTECEDENTES DE LA INVENCION

**[0002]** Los dispositivos de comunicación personal de manos libres se utilizan en una variedad de aplicaciones profesionales y personales. En general, los dispositivos de comunicación personal de manos libres son útiles para cualquier aplicación en donde se desee proporcionar comunicación en uno o dos sentidos mientras se dejan las manos del usuario libres para realizar otras tareas variadas. Los dispositivos de comunicación personal de manos libres son utilizados por, por ejemplo, operadores telefónicos y usuarios de multimedia quienes reciben y/o envían comunicaciones utilizando el dispositivo y al mismo tiempo, utilizan ambas manos para otras tareas.

**[0003]** Lo auriculares son un ejemplo bien conocido de dispositivos de comunicación personal de manos libres. Los auriculares son típicamente utilizados en la cabeza del usuario y tienen parlantes opuestos, uno para cada oreja del usuario, unidos por una banda para la cabeza la cual se extiende sobre la cabeza del usuario. Estos dispositivos pueden también incluir un brazo el cual tiene un extremo unido a la banda para la cabeza y un segundo extremo que contiene un micrófono. Este brazo es a veces flexible y contiene características de memoria tales como que el brazo se puede posicionar en y fuera de varias posiciones elegibles.

**[0004]** Una desventaja significativa de los auriculares conocidos es que a veces resultan incómodos de usar y se enredan con o interfieren con el cabello del usuario. Los auriculares conocidos tampoco son tan ajustables como se desea regularmente y son típicamente rígidos tal que no se ajustan a un amplio rango de usuarios que tienen partes del cuerpo diferentes. Debido a que los auriculares están disgustos para estar en contacto

constante con las orejas y/o cabeza del usuario, muchos usuarios se quejan de incomodidad en al cabeza y/o las orejas.

**[0005]** La solicitud de patente de Estados Unidos No. 10/218,277 por el presente inventor Christopher Gantz, la divulgación de la cual se incorpora aquí a modo de referencia, divulga un dispositivo de comunicación personal y sistema de altavoz de uso personal que se puede emplear alrededor del cuello de un usuario. El sistema de comunicación y altavoz incluye una banda sujetadora para el cuello unida a una carcaza de altavoz y un brazo de soporte del micrófono ajustable. La banda sujetadora para el cuello se puede rotar alrededor del eje por 180° para convertirla de una configuración del oído izquierdo a una del oído derecho y viceversa. Hay una almohadilla unida al extremo distal de la banda sujetadora para el cuello relativa a la carcaza del altavoz. En una modalidad particular, la carcaza del altavoz puede desprenderse de su base y es automáticamente cambiada al modo d auricular en donde el altavoz se monta en la oreja de usuario.

**[0006]** La solicitud de patente arriba descrita resuelve muchos de los problemas con los auriculares conocidos descritos arriba. Sin embargo, aun son deseables mejoras adicionales sobre este dispositivo. Por ejemplo, es deseable proporcionar un dispositivo mejorado que se ajusta más fácilmente para acomodarlo a una gran variedad de tipos y tamaños de cuerpos. Es deseable además proporcionar un dispositivo que se ajusta más fácilmente entre el uso de auricular y audífono.

**[0007]** Como tal, es deseable proporcionar un dispositivo de comunicación personal de manos libres que supera las deficiencias de los dispositivos conocidos. Es deseable proporcionar un dispositivo de comunicación personal de manos libres que se soporta a si mismo y es ajustable para encajar en individuos que tienen diferentes partes del cuerpo. Es deseable proporcionar tal dispositivo de comunicación que es fácil de poner y remover. Es deseable proporcionar un dispositivo de comunicación de manos libres que es ajustable para encajar ya sea un lado izquierdo o uno derecho del usuario. Es deseable proporcionar un dispositivo tal que elimina la incomodidad en al cabeza y las orejas generalmente asociada con muchos auriculares conocidos. Es deseable además proporcionar tal dispositivo de comunicación que mantiene y mejora la calidad del sonido producido y recibido y el desempeño de los dispositivos actualmente conocidos.

## RESUMEN DE LA INVENCION

**[0008]** La presente invención se un dispositivo de comunicación personal de manos libres que supera muchas de las falencias de los dispositivos conocidos.

**[0009]** El dispositivo de comunicación personal de manos libres incluye un banda para el cuello elástica alargada que soporta el dispositivo de comunicación alrededor del cuello del usuario. La banda para el cuello tiene características de memoria y se puede doblar a lo largo de su longitud, o al menos parte de su longitud, tal que la banda para el cuello se puede posicionar en y fuera de varias posiciones elegibles. Un dispositivo acústico de salida se encuentra unido a la banda para el cuello y ubicado cerca al oído del usuario cuando el dispositivo de comunicación es usado alrededor del cuello del usuario. Un micrófono se encuentra unido a un primer extremo de un brazo elástico unido a la banda para el cuello.

**[0010]** El dispositivo de comunicación de manos libres también puede incluir un audífono unido, por ejemplo, al segundo extremo de la banda para el cuello. El audífono se puede remover de la banda para el cuello tal que el audífono se puede insertar en el oído del usuario cuando el dispositivo de comunicación se utiliza alrededor del cuello del usuario. Una conexión eléctrica proporciona comunicación hacia y desde el audífono y le micrófono.

**[0011]** El dispositivo de comunicación de manos libres de la presente invención puede ajustarse y acomodarse fácilmente para que pueda ser utilizado confortablemente y de manera firme y estable alrededor del cuello, justo en o sobre los hombros, del usuario. Tiene la ventaja de no estar en contacto directo con áreas más sensibles del cuerpo, tal como la oreja y la cabeza o el cuero cabelludo. La presente invención incluye una alternativa ergonómica al auricular o audífono tradicional. El dispositivo de la presente invención coloca una combinación de altavoz y micrófono en o cerca de la intersección del cuello y el hombro del usuario, eliminando así la necesidad de cualquier tipo de contacto con o montaje en la cabeza o la oreja del usuario. La libertad de movimiento y rotación proporcionada por las características elásticas y de memora de la banda para el cuello proporcionan ventajas significativas donde se desean movilidad, estabilidad y comodidad de ajuste.

[0012] Además, una modalidad de la presente invención permite al usuario colocar un audífono removible en el oído del usuario, si se desea. Por esta disposición, el usuario puede desenganchar fácilmente el audífono de la banda para el cuello elástica e insertarlo en el oído del usuario para conversaciones más privadas. Adicionalmente, el dispositivo de comunicación personal de manos libres puede incluir un interruptor y/o un módulo de control para cambiar la salida del dispositivo del modo de altavoz al modo de audífono para eliminar la necesidad de controlar el volumen cuando el usuario coloca temporalmente (por preocupaciones momentárias de privacidad, por ejemplo) el audífono en el oído del usuario. El interruptor puede ser manual o el dispositivo puede estar configurado para automáticamente cambiar a modo de audífono cuando se utiliza el audífono.

## BREVE DESCRIPCION DE LOS DIBUJOS

[0013] Los dibujos ilustran la mejor modalidad actualmente contemplada que llevan a cabo la invención.

[0014] En los dibujos:

[0015] La figura 1 es una vista en perspectiva del dispositivo de comunicación personal de manos libres usado alrededor del cuelo del usuario;

[0016] La figura 2 es una vista superior de una primera modalidad del dispositivo de comunicación de manos libres;

[0017] La figura 3 es una vista superior del dispositivo de comunicación de manos libres mostrado en la figura 2, donde se ha removido el audífono;

[0018] La figura 4 es una vista superior del dispositivo, mostrando la característica de memoria y habilidad de plegado de la banda para el cuello elástica alargada;

[0019] La figura 5 es una vista lateral del dispositivo de comunicación personal de manos libres;

[0020] La figura 6 es una vista detallada del módulo de control;

[0021] La figura 7 es una vista lateral seccional del dispositivo de comunicación personal de manos libres;

[0022] La figura 8 es una vista superior seccional del componente de audio;

**[0023]** La figura 9 es una vista de plano superior de una modalidad alternativa del dispositivo de comunicación personal de manos libres;

**[0024]** La figura 10 es una vista en perspectiva de una modalidad alternativa del dispositivo de comunicación personal de manos libres utilizado alrededor del cuello del usuario; y

**[0025]** La figura 11 es una vista de plano superior de una modalidad alternativa del dispositivo de comunicación personal de manos libres.

## DESCRIPCION DETALLADA DE LAS MODALIDADES PREFERIDAS

**[0026]** En las modalidades preferidas de la presente invención descritas en detalle debajo, se proporciona un dispositivo de comunicación personal de manos libres. Se debe entender que los dibujos y la descripción se consideran ejemplificaciones de los principios de la invención, la cual se define más particularmente en las reivindicaciones adjuntas.

**[0027]** Refiriéndonos a las figuras 1 y 2, se muestra una modalidad preferida del dispositivo de comunicación personal de manos libres. A conjunto para el cuello 15 incluye una banda para el cuello 17 alargada elástica para soportar el conjunto para el cuello 15 alrededor del cuello del usuario. La banda para el cuello 17 elástica se puede doblar y/o girar a lo largo de al menos una parte de su longitud y tiene características de memoria tal que cuando la banda para el cuello 17 es movida a una cierta posición esta retiene esa posición. De esta forma, la forma y la posición de la banda para le cuello 17 puede modificarse tal que se ajusta confortablemente alrededor del cuello del usuario. Esto también permite que los diferentes componentes de audio llevados por la banda para el cuello 17 (los cuales se describen en más detalle debajo) sean posicionados en una ubicación en la cual no interferirán con, por ejemplo, la quijada o la boca de un usuario. Como se muestra en la figura 1, la banda para el cuello 17 se lleva alrededor del cuello del usuario 16 y reposa ya sea en los hombros del usuario 14, o en el área en donde los hombros 14 se unen con el cuello 16. Debido a que la banda para el cuello 17 se puede plegar y/o girar a lo largo de su longitud y tiene características de memoria, puede amoldarse para que se ajuste adecuadamente alrededor el físico individual del usuario tal que tiene estabilidad y confortable de usar.

[0028] Refiriéndonos ahora a las figuras 1, 2, 7 y 8, en una modalidad particular, la bada elástica para el cuello 17 incluye un alambre plegable 20 o un tubo metálico y un recubrimiento de caucho flexible 22, que preferiblemente comprende un elastómero termoplástico. Sin embargo, debe reconocerse que la banda para el cuello 17 elástica puede comprender cualquiera de una variedad de materiales conocidos que son flexibles y tienen características de memoria tal que la banda para el cuello 17 es se puede posicionar en y fuera de una variedad de posiciones a lo largo de toda su longitud, o alternativamente a lo largo de una parte de ésta.

[0029] Un dispositivo de salida acústica o altavoz 19 se encuentra unido a la banda para el cuello 17 elástica y reside dentro de una carcaza de altavoz 31. El altavoz 19 recibe la entrada de audio y eléctrica del cable de audio/energía del altavoz 21 y puede comprender uno cualquiera de una variedad de altavoces de audio conocidos en el arte. Le altavoz 19 sin embargo debe ser capaz de proporcionar suficiente salida de audio como para que el usuario pueda escuchar la salida de audio cuando el equipo para el cuello 15 se lleva alrededor del cuello del usuario y la carcaza del altavoz esta reposando en el hombro del usuario, como se describirá adelante, y como se muestra en la figura 1. La salida de audio del altavoz 19 se puede controlar por un control de volumen, el cual en la modalidad mostrada es el miembro giratorio 18.

[0030] Refiriéndonos a las figuras 1 y 2, una pantalla de altavoz 30 cubre el altavoz 19 y proteger el altavoz 19 de daños. La pantalla de altavoz 30 esta preferiblemente hecha de metal e incluye una serie de orificios 28 los cuales permiten que el audio del altavoz 19 pase a través de la pantalla 30.

[0031] El cable de audio/electricidad 21 proporciona señales de audio y eléctricas al equipo para el cuello 15 e incluye un conector de 2,5 milímetros que está conectado a la carcaza del altavoz 31 por medio de un anclaje a prueba de tensiones mecánicas (no se muestra). El anclaje a prueba de tensiones mecánicas proporciona resistencia y durabilidad a la conexión y preferiblemente se forma a partir de una pieza de caucho con muescas, en forma de cono que proporciona una conexión flexible y durable. También será reconocido por aquellos con habilidad en el arte que la banda para el cuello 17 puede incluir in transmisor inalámbrico en lugar del cable de audio/electricidad 21. Tal disposición también incluirá una fuente de energía

aparte, tal como por ejemplo una pila, para dar electricidad a los varios componentes de audio proporcionados con el dispositivo.

**[0032]** Como se muestra en las figuras 1, 2 y 7, el conjunto para el cuello 15 incluye además un brazo pescante flexible 23 que tiene un micrófono 25 unido a su extremo distal 27 relativo al altavoz 19. El brazo pescante flexible 23 esta fabricado preferiblemente de un material flexible tal como alambre, un plástico flexible con memoria, o tubo metálico 20 y un recubrimiento de caucho flexible 22, preferiblemente incluyendo un polímero termoplástico. El brazo pescante 23 se puede posicionar en y fuera de una variedad de posiciones a lo largo de toda su longitud, o parte de la misma. El micrófono 25 está nido al extremo del brazo pescante 23 y consiste de uno cualquiera de una variedad de micrófonos conocidos para recibir sonido de una fuente externa. El micrófono 25 esta colocado dentro de una cobertura de espuma 26 para proteger el micrófono 25 del sonido del viento y aun así permitir la recepción de sonido. El brazo pescante 23 se puede por lo tanto posicionar tal que puede moverse fácilmente a varias posiciones y aun permanecerá a donde se movió. Esto permite que el micrófono 25 se posicione en un lugar donde no interferirá con la boca o la quijada del usuario, y aun así permite que el micrófono 25 sea movido más cerca del usuario cuando el usuario desea hablar suavemente y aun así ser escuchado.

**[0033]** Refiriéndonos ahora a las figuras 3 y 7, la modalidad ilustrada del equipo para el cuello 15 incluye un audífono removible, el cual generalmente se conoce en el arte como microaudífono 47. El microaudífono 47 esta unido de manera liberable al extremo distal 49 de la banda para el cuello elástica 17. El microaudífono 47 se puede desprender de la banda para el cuello elástica 17 y aun así permanece conectado a la banda para el cuello elástica 17 por un cable de audio/electricidad 51 retráctil. De acuerdo con esta disposición, el microaudífono 47 puede removerse fácilmente de la banda para el cuello elástica 17 y vuelto a unir a la banda para el cuello elástica 17. En la modalidad mostrada, el cable de audio/electricidad retráctil 51 reside dentro de una cavidad con sus caras abiertas 54.

**[0034]** El microaudífono 47 y el conjunto para el cuello 15 pueden alternativamente incluir transmisores inalámbricos y le microaudífono puede incluir una fuente de electricidad. En tal disposición, el cable de audio/electricidad 51 no sería necesario, ya que el microaudífono 47 sería

capaz de transmitir inalámbricamente con el equipo para el cuello 15. El microaudífono 47 proporciona muchas ventajas que serán reconocidas por aquel con habilidad en el arte. El microaudífono proporciona privacidad al que use el equipo para el cuello 15. El microaudífono 47 también incrementa la habilidad del usuario para escuchar la salida de audio cuando se compara con el altavoz 19. Esto es particularmente cierto si el equipo para el cuello se utiliza en una ambiente poblado y/o ruidoso.

**[0035]** Refiriéndonos a la figura 7, el extremo distal 49 de la banda para el cuello elástica 17 define una cavidad de extremo abierto 54 para recibir de manera liberable y retener el microaudífono 47. De acuerdo con esta disposición, las partes laterales 44 de la cavidad de extremo abierto 54 son flexibles tal que el microaudífono 47 se puede insertar en y remover fácilmente de la cavidad 54 en la banda para el cuello elástica 17. En la modalidad mostrada, el microaudífono 47 tiene un collar que se proyecta hacia fuera 48 que tiene el tamaño y la forma para ser recibido en una disposición de ajuste a presión por una muesca anular 52 en el interior de la cavidad 54, para retener así de manera segura y liberable el microaudífono 47 en la cavidad 54. Se pueden emplear diferentes conexiones liberables, tal como por ejemplo una disposición en donde el microaudífono 47 tiene la forma y el tamaño para que se pueda ajustar por presión en la cavidad 54.

**[0036]** En la modalidad mostrada, el cable de audio/electricidad retráctil 51 reside dentro de la cavidad de extremo abierto 54, de tal manera que es posible retraer y desplegar con facilidad el cable de audio/electricidad 51 y el microaudífono 47. In la figura 7, el cable de audio/electricidad se muestra en su estado retraído ya que el microaudífono 47 esta anidado en la cavidad de extremo abierto 54. El cable de audio/electricidad 51 está unido al microaudífono 47 por un empalme resistente a la tensión 53, el cual proporciona resistencia y durabilidad a la conexión y esta preferiblemente formado de una pieza de caucho con muesca en forma de cono y proporciona una conexión flexible y durable.

**[0037]** En uso, el microaudífono 47 se desprende del equipo para el cuello 15 y se inserta en el cuello del usuario, proporcionando así audio al usuario. La remoción del microaudífono 47 del equipo para el cuello 15 puede causar automáticamente que el altavoz 19 deje de reproducir audio, o alternativamente, el microaudífono 47 y el altavoz pueden ser controlados por un módulo de control 41 (mostrado en la figura 6). El módulo de control 41

esta dispuesto para controlar el volumen del altavoz 19. Más específicamente, el módulo de control 41 incluye el volumen de control, el cual, en la modalidad mostrada, es un medio rodante operado manualmente 43. Adicionalmente, el módulo de control 41 puede incluir un interruptor de encendido/apagado 45 para selectivamente proporcionar electricidad al equipo para el cuello 15, incluyendo el altavoz 19 y el micrófono 25. El módulo de control 41 preferiblemente incluye además un amplificador (no se muestra) para llevar eléctricamente la entrada de audio al altavoz 19 y desde el micrófono 25. El módulo 41 puede además incluir medios para proporcionar electricidad al equipo para el cuello 15, tal como por ejemplo una batería.

**[0038]** Refiriéndonos a la figura 4, el equipo para el cuello 15 es ajustable tal que el altavoz 19 puede posicionarse ya sea en el odio izquierdo o derecho del usuario. Como se muestra por la flecha 35, la banda para el cuello elástica 17 es ajustable 180° alrededor del eje 36 tal que las configuraciones izquierda 37 y derecha 39 son posibles. En adición a las configuraciones mostradas, la banda para el cuello elástica 17 se puede posicionar tal que la banda para el cuello 17 se ajusta para que se amolde al físico individual del usuario. Por ejemplo, si el cuello del usuario es ancho, la banda para el cuello 17 se posiciona tal que el altavoz 19 y el microaudífono 47 están bastante separados.

**[0039]** Refiriéndonos a la figura 5, se muestra una vista lateral del equipo para el cuello 15.

**[0040]** La banda elástica para el cuello 17 puede proporcionarse con una abrazadera para el cuell 56 la cual puede incluir una pieza curva de caucho flexible o rígido (ver figura 9) o una manga de plástico o espuma blanda (ver figura 11). La abrazadera para el cuello 56 proporciona estabilidad y forma adicionales a la banda pare le cuello 17 y ayuda a la banda para el cuello 17 a ajustarse adecuadamente alrededor del cuello del usuario.

**[0041]** Refiriéndonos a la figura 9, una modalidad adicional del equipo para el cuello 15 incluye una cavidad con una cara abierta 57, la cual se abre a lo largo de un extremo distal 49 de la banda para el cuello 17. La cavidad con una cara abierta 57 ventajosamente permite al cable de audio/electricidad 51 extenderse en una dirección transversal al extremo

distal 49de la banda para el cuello 17 alargada cuando el microaudífono 47 es insertado en el oído del usuario.

**[0042]** En la disposición particular mostrada en la figura 9, el microaudífono 47 incluye un miembro alargado ahusado 59 que esta dimensionado para ser ligeramente más pequeño que el ancho de la cavidad con una cara abierta 54. En esta disposición, el miembro alargado ahusado 59 se ajusta a presión en la cavidad con una cara abierta 54 para asegurar de manera liberable el microaudífono 47 al extremo distal 49 de la banda para el cuello.17.

**[0043]** Refiriéndonos a la figura 10, se reconoce además que el extremo distal 49 de la banda para el cuello 17 puede incluir un altavoz fijo adicional 55 además de o en lugar de el microaudífono 47. En tal disposición, los altavoces 19, 55 están dispuestos a cada lado de la cabeza del usuario y proporcionan sonido bilateral al usuario.

**[0044]** refiriéndonos a la figura 11, se muestra una disposición en donde el extremo distal 49 de la banda para el cuello 17 incluye una cavidad de extremo cerrado y cara abierta 61. En esta disposición, el microaudífono 47 tiene forma y tamaño para encajar dentro de la cavidad de extremo cerrado y cara abierta 61 de una manera de ajuste a presión, para unir de manera liberable el microaudífono 47 al extremo distal 49 de la banda para el cuello 17.

**[0045]** Se reconoce que el equipo para el cuello 15 se puede usar en una variedad de ambientes. Como tal, los altavoces 19, 55, el microaudífono 47, y el micrófono 25 pueden designarse de tal forma que son a prueba de agua. Refriéndonos brevemente a la figura 7, se puede proporcionar papel repelente de agua (no se muestra) en el micrófono 25 para proteger el micrófono 25 de daño causado por la humedad o agua. En adición, la carcaza del altavoz 31 puede incluir papel repelente de agua (no se muestras) el cual preferiblemente se posiciona sobre y debajo del altavoz 19 y/o dentro de la pantalla del altavoz 30 y la parte inferior de la carcaza del altavoz 31. El papel repelente de agua previene que el agua ingrese a la carcasa del altavoz 31 y dañe el altavoz 19.

**[0046]** También se reconoce que en una modalidad el equipo para el cuello 15 puede no incluir un microaudífono 47. En tal disposición, el extremo distal 49 de la banda para el cuello 17 formaría un botón con peso el

cual compensa el peso del altavoz 19, el brazo pescante 23 y el micrófono 25 cuando el equipo para el cuello se utiliza alrededor del cuello del usuario.

**[0047]** Aunque esta invención es susceptible de modalidades en diferentes formas, los dibujos y la descripción describen en detalle una modalidad preferida de la invención. No tienen la intención de limitar el amplio aspecto de la invención a las modalidades ilustradas.

## REIVINDICACIONES

Lo que reivindica es:

1. Un dispositivo de comunicación personal de manos libres para utilizar alrededor del cuello de un usuario, el dispositivo de comunicación caracterizado porque comprende:

una banda para el cuello elástica alargada para soportar el dispositivo de comunicación alrededor del cuello del usuario, la banda para el cuello tiene memoria característica y es plegable a lo largo de su longitud tal que la banda para el cuello se puede formar en y fuera de varias posiciones elegibles;

un dispositivo de salida acústico unido a la bada del cuello y posicionado cerca del oído del usuario cuando el dispositivo de comunicación se utiliza alrededor de cuello del usuario; y

un micrófono unido a un primer extremo de la banda para el cuello.

2. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además una audífono unido un segundo extremo de la banda para el cuello, el audífono es desprendible de la banda para el cuello tal que se puede insertar en el oído de usuario cuando el dispositivo de comunicación se utiliza alrededor del cuello del usuario.

3. El dispositivo de comunicación personal de manos libres de la reivindicación 2, caracterizado porque comprende además una conexión eléctrica entre el audífono y el dispositivo de comunicación.

4. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además una batería.

5. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además una conexión eléctrica cableada.

6. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además una conexión eléctrica inalámbrica.

7. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además un audífono unido a un segundo extremo de la banda para el cuello.

8. El dispositivo de comunicación personal de manos libres de la reivindicación 7, caracterizado porque el audífono es desprendible de la banda para el cuello y se puede insertar en un oído del usuario cuando el dispositivo de comunicación se lleva alrededor del cuello del usuario.

9. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque la banda para el cuello elástica comprende un alambre plegable con un recubrimiento de caucho flexible.

10. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además un brazo con peso unido a un segundo extremo de la banda para el cuello, el brazo con peso tiene peso suficiente para balancear el dispositivo acústico de salida y al micrófono cuando el dispositivo se lleva alrededor del cuello del usuario.

11. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además medios para controlar el volumen del dispositivo acústico de salida.

12. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque el dispositivo acústico de salida comprende un altavoz de audio.

13. El dispositivo de comunicación personal de manos libres de la reivindicación 8, caracterizado porque la banda para el cuello comprende una cavidad que facilita el retiro y el despliegue de un cable eléctrico conectado al audífono.

14. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además un segundo dispositivo de salida acústico unido a la banda del cuello y que se puede posicionar cerca del otro oído del usuario.

15. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además una abrazadera para el cuello unida a la banda para el cuello para proporcionar estabilidad adicional a la banda para el cuello.

16. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque el dispositivo de salida acústico es a prueba de agua.

17. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque el micrófono es a prueba de agua.

18. Un dispositivo de comunicación personal de manos libres para llevarlo alrededor del cuello del usuario, caracterizado porque el dispositivo de comunicación comprende:

una banda para el cuello elástica para soportar el dispositivo de comunicación alrededor del cuello del usuario;

un dispositivo de salida acústico unido a la banda para el cuello elástica alargada y que se puede posicionar cerca de un oído del usuario cuando el dispositivo de comunicación se lleva alrededor del cuello del usuario; y

un audífono unido a un extremo de la banda para el cuello, el audífono es desprendible de la banda para el cuello y se puede insertar en un oído del usuario cuando el dispositivo de comunicación se lleva alrededor del cuello del usuario.

19. El dispositivo de comunicación personal de manos libres de la reivindicación 4, caracterizado porque el audífono esta unido de manera removible al dispositivo de comunicación por un cable eléctrico que tiene características de memoria.

20. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque comprende además una conexión eléctrica entre el audífono y el dispositivo de comunicación.

21. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque comprende además una batería.

22. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque comprende además una conexión eléctrica cableada.

23. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque comprende además una conexión eléctrica inalámbrica.

24. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque la banda para el cuello elástica comprende un cable plegable y un recubrimiento de caucho flexible.

25. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque comprende además un brazo con peso unido a la segunda mitad de la banda para el cuello, el brazo con peso de suficiente peso como para balancear el dispositivo de salida acústico y el micrófono cuando el dispositivo se utiliza alrededor del cuello del usuario.

26. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque comprende además medios para controlar el volumen del dispositivo de salida acústico.

27. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque el dispositivo de salida acústico comprende un altavoz de audio.

28. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque la banda para el cuello comprende

una cavidad que facilita el retiro y el despliegue del cable eléctrico conectado al audífono.

29. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque comprende además un segundo dispositivo de salida acústico unido a la banda para el cuello y que se puede posicionar cerca de otro oído del usuario.

30. El dispositivo de comunicación personal de manos libres de la reivindicación 1, caracterizado porque comprende además una abrazadera para el cuello unida a la banda para el cuello para proporcionar estabilidad adicional a la banda para el cuello.

31. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque el dispositivo de salida acústico es a prueba de agua.

32. El dispositivo de comunicación personal de manos libres de la reivindicación 18, caracterizado porque el micrófono es a prueba de agua.

33. Un dispositivo de comunicación personal de manos libres para llevarlo alrededor del cuello de un usuario, caracterizado porque el dispositivo de comunicación comprende:

una banda para el cuello alargada para soportar el dispositivo de comunicación alrededor del cuello del usuario, la banda para el cuello tiene características de memoria y es plegable a lo largo de su longitud tal que la banda para el cuello se puede formar en y fuera de varias posiciones elegibles;

un dispositivo de salida acústico unido a la banda para el cuello y que se posiciona cerca de un oído del usuario cuando el dispositivo de comunicación se lleva alrededor del cuello del usuario;

un micrófono unido a un primer extremo de la banda para el cuello;

un audífono unido a un extremo de la banda para el cuello, el audífono es desprendible de la banda para el cuello y se puede insertar en

un oído del usuario cuando el dispositivo de comunicación se lleva alrededor del cuello de un usuario; y

una abrazadera para el cuello unida a la banda para el cuello para proporcionar estabilidad adicional a la banda para el cuello.

# DISPOSITIVO DE COMUNICACIÓN PERSONAL DE MANOS LIBRES

## CAMPO DE LA INVENCION

**[0001]** La presente invención se relaciona con el campo de los dispositivos de comunicación personal de manos libres. Más específicamente, la presente invención se relaciona con un dispositivo de comunicación personal que es utilizado por el usuario alrededor del cuello.

## ANTECEDENTES DE LA INVENCION

**[0002]** Los dispositivos de comunicación personal de manos libres se utilizan en una variedad de aplicaciones profesionales y personales. En general, los dispositivos de comunicación personal de manos libres son útiles para cualquier aplicación en donde se desee proporcionar comunicación en uno o dos sentidos mientras se dejan las manos del usuario libres para realizar otras tareas variadas. Los dispositivos de comunicación personal de manos libres son utilizados por, por ejemplo, operadores telefónicos y usuarios de multimedia quienes reciben y/o envían comunicaciones utilizando el dispositivo y al mismo tiempo, utilizan ambas manos para otras tareas.

**[0003]** Lo auriculares son un ejemplo bien conocido de dispositivos de comunicación personal de manos libres. Los auriculares son típicamente utilizados en la cabeza del usuario y tienen parlantes opuestos, uno para cada oreja del usuario, unidos por una banda para la cabeza la cual se extiende sobre la cabeza del usuario. Estos dispositivos pueden también incluir un brazo el cual tiene un extremo unido a la banda para la cabeza y un segundo extremo que contiene un micrófono. Este brazo es a veces flexible y contiene características de memoria tales como que el brazo se puede posicionar en y fuera de varias posiciones elegibles.

**[0004]** Una desventaja significativa de los auriculares conocidos es que a veces resultan incómodos de usar y se enredan con o interfieren con el cabello del usuario. Los auriculares conocidos tampoco son tan ajustables como se desea regularmente y son típicamente rígidos tal que no se ajustan a un amplio rango de usuarios que tienen partes del cuerpo diferentes. Debido a que los auriculares están disgustos para estar en contacto

constante con las orejas y/o cabeza del usuario, muchos usuarios se quejan de incomodidad en al cabeza y/o las orejas.

**[0005]** La solicitud de patente de Estados Unidos No. 10/218,277 por el presente inventor Christopher Gantz, la divulgación de la cual se incorpora aquí a modo de referencia, divulga un dispositivo de comunicación personal y sistema de altavoz de uso personal que se puede emplear alrededor del cuello de un usuario. El sistema de comunicación y altavoz incluye una banda sujetadora para el cuello unida a una carcaza de altavoz y un brazo de soporte del micrófono ajustable. La banda sujetadora para el cuello se puede rotar alrededor del eje por 180° para convertirla de una configuración del oído izquierdo a una del oído derecho y viceversa. Hay una almohadilla unida al extremo distal de la banda sujetadora para el cuello relativa a la carcaza del altavoz. En una modalidad particular, la carcaza del altavoz puede desprenderse de su base y es automáticamente cambiada al modo d auricular en donde el altavoz se monta en la oreja de usuario.

**[0006]** La solicitud de patente arriba descrita resuelve muchos de los problemas con los auriculares conocidos descritos arriba. Sin embargo, aun son deseables mejoras adicionales sobre este dispositivo. Por ejemplo, es deseable proporcionar un dispositivo mejorado que se ajusta más fácilmente para acomodarlo a una gran variedad de tipos y tamaños de cuerpos. Es deseable además proporcionar un dispositivo que se ajusta más fácilmente entre el uso de auricular y audífono.

**[0007]** Como tal, es deseable proporcionar un dispositivo de comunicación personal de manos libres que supera las deficiencias de los dispositivos conocidos. Es deseable proporcionar un dispositivo de comunicación personal de manos libres que se soporta a sí mismo y es ajustable para encajar en individuos que tienen diferentes partes del cuerpo. Es deseable proporcionar tal dispositivo de comunicación que es fácil de poner y remover. Es deseable proporcionar un dispositivo de comunicación de manos libres que es ajustable para encajar ya sea un lado izquierdo o uno derecho del usuario. Es deseable proporcionar un dispositivo tal que elimina la incomodidad en al cabeza y las orejas generalmente asociada con muchos auriculares conocidos. Es deseable además proporcionar tal dispositivo de comunicación que mantiene y mejora la calidad del sonido producido y recibido y el desempeño de los dispositivos actualmente conocidos.

FIG. 1

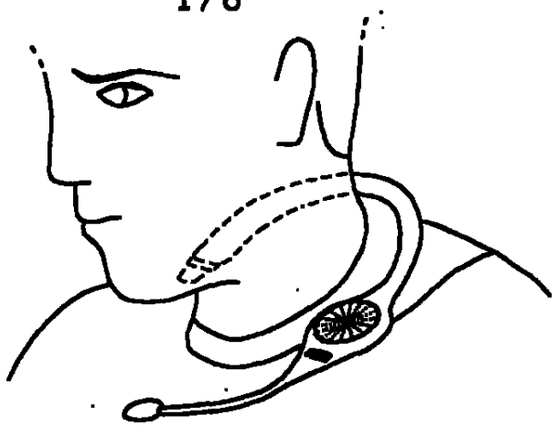
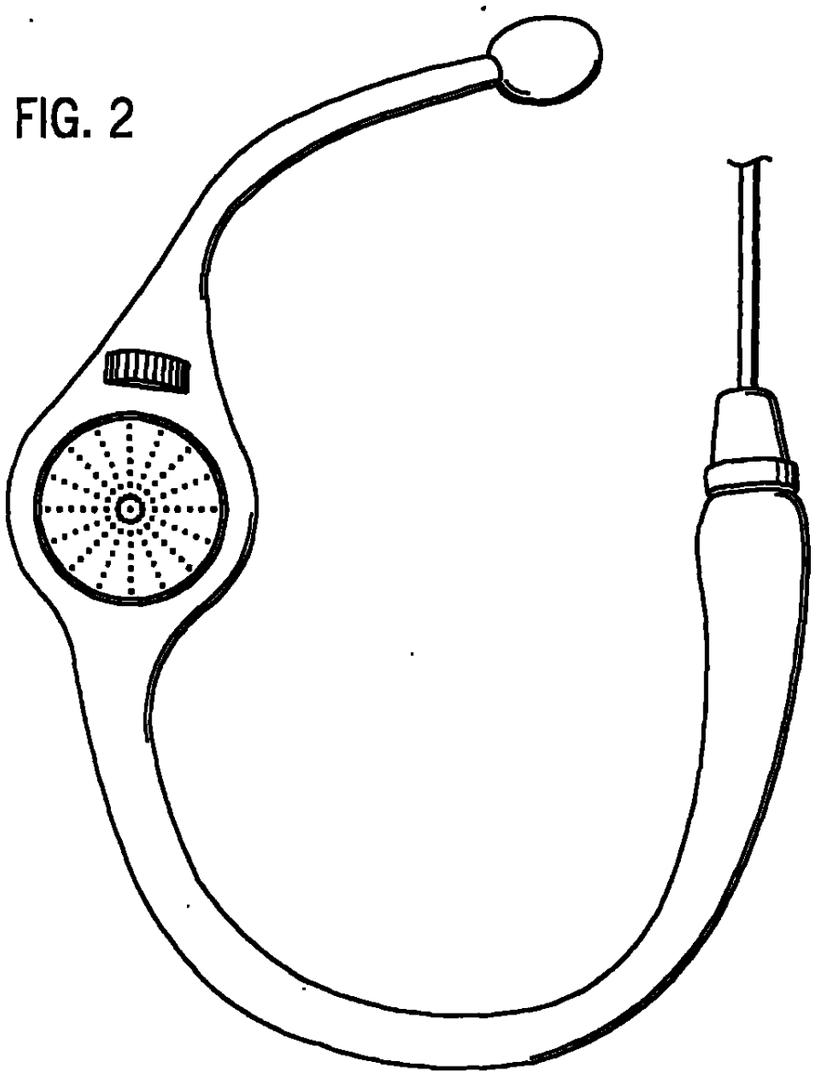


FIG. 2



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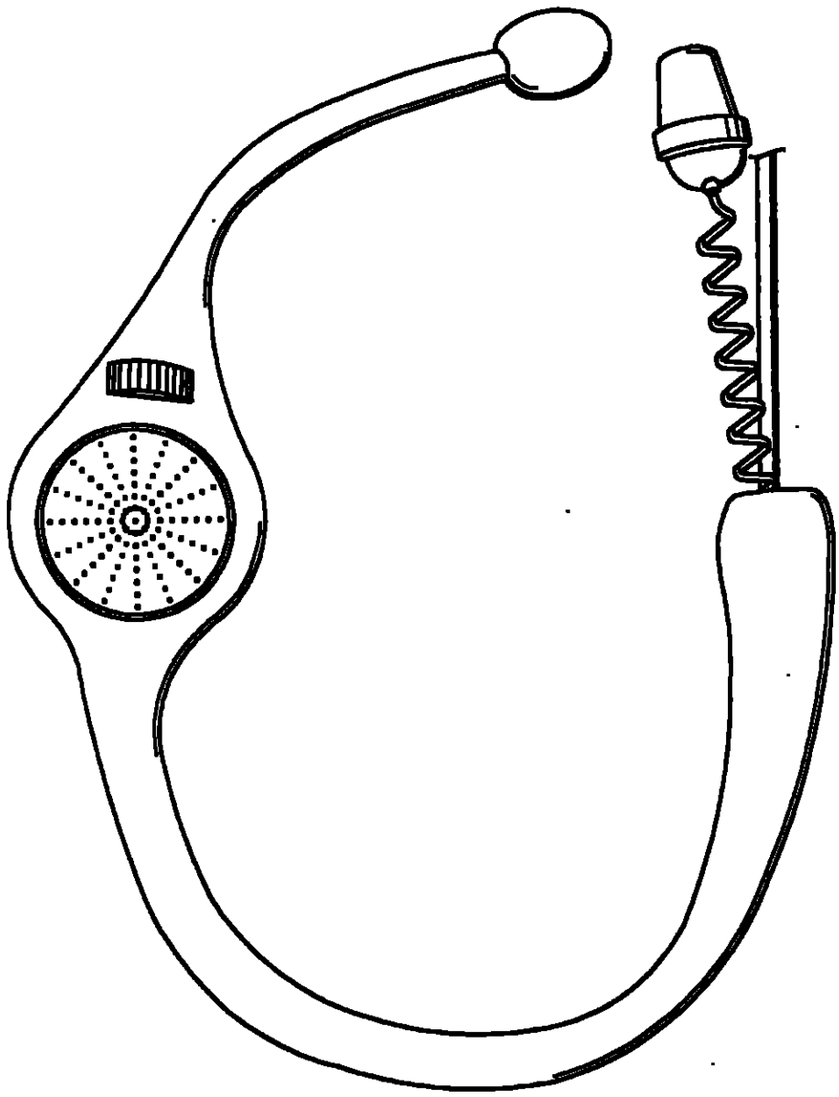


FIG. 3

FIG. 4

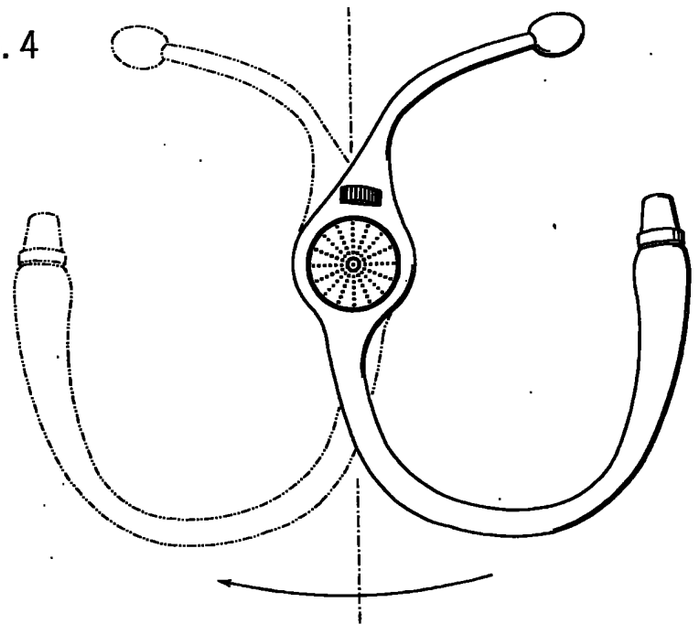
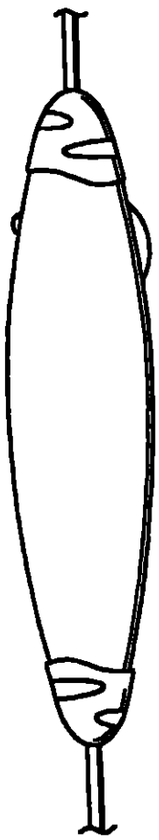


FIG. 5

FIG. 6



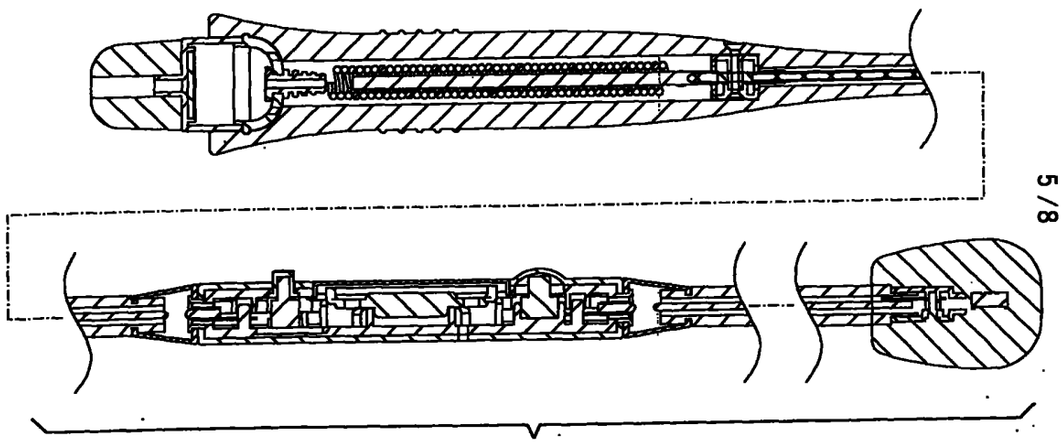




FIG. 7

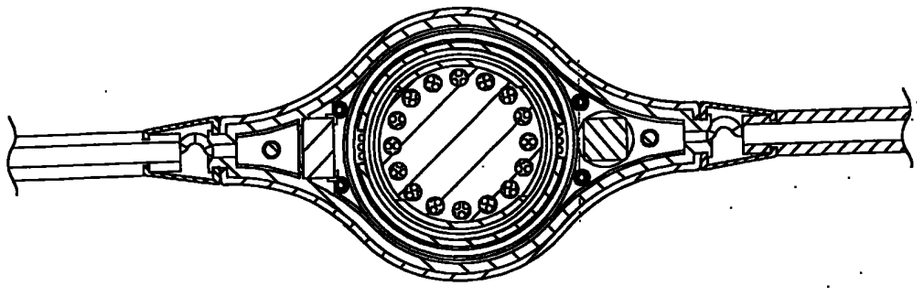




FIG. 8

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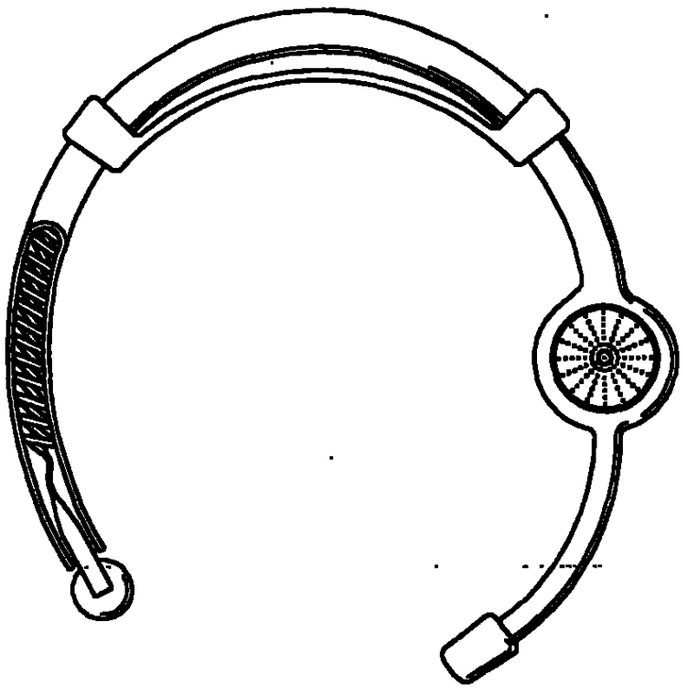
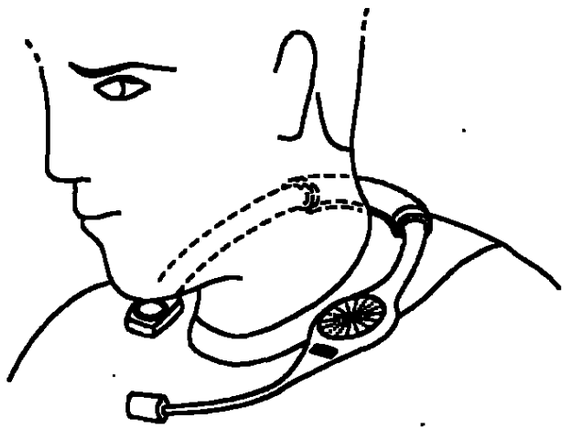


FIG. 9

FIG. 10



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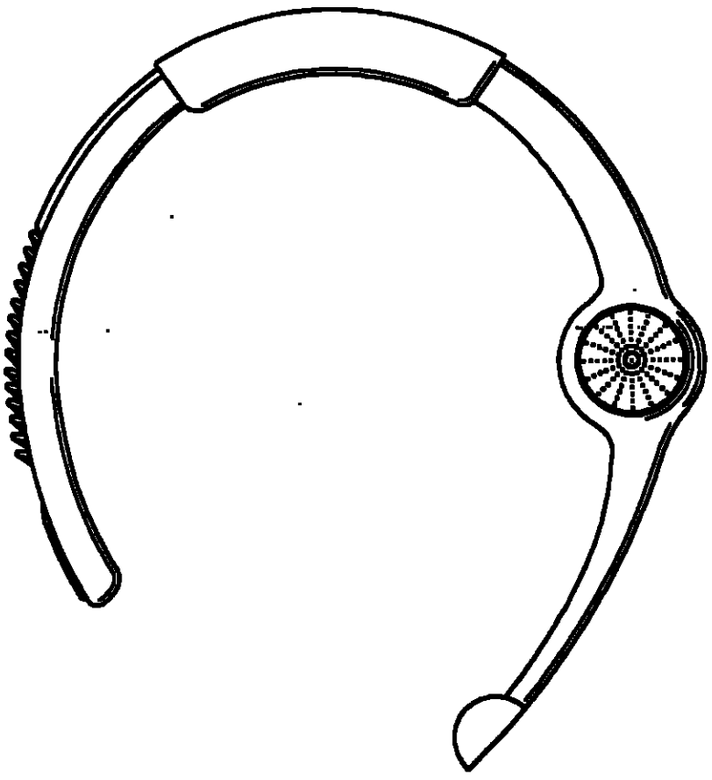

FIG. 11

From the INTERNATIONAL BUREAU 52 52

# PCT

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

JOCHMAN, Joseph, J.
Andrus, Sceales, Starke & Sawall, LLP
100 East Wisconsin Avenue
Suite 1100
Milwaukee, WI 53202
ETATS-UNIS D'AMERIQUE

| | |
|---|---|
| Date of mailing *(day/month/year)*<br>07 June 2005 (07.06.2005) | |
| Applicant's or agent's file reference<br>4848-00331 | **IMPORTANT NOTIFICATION** |
| International application No.<br>PCT/US05/000297 | International filing date *(day/month/year)*<br>06 January 2005 (06.01.2005) |
| International publication date *(day/month/year)* | Priority date *(day/month/year)*<br>09 January 2004 (09.01.2004) |
| Applicant<br>KOSS CORPORATION et al | |

1. By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to all earlier application(s) whose priority is claimed. Unless otherwise indicated by the letters "NR", in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

2. *(If applicable)* The letters "NR" appearing in the right-hand column denote a priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

3. *(If applicable)* An asterisk (*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b) (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as the priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

| Priority date | Priority application No. | Country or regional Office or PCT receiving Office | Date of receipt of priority document |
|---|---|---|---|
| 09 January 2004 (09.01.2004) | 60/535,314 | US | 18 February 2005 (18.02.2005) |
| 05 January 2005 (05.01.2005) | 11/029,911 | US | 22 April 2005 (22.04.2005) |

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 740 14 35

Authorized officer
Baechler Francois

Facsimile No. +41 22 338 70 90
Telephone No. +41 22 338 9544

# PATENT COOPERATION TREATY

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From the INTERNATIONAL BUREAU

## PCT

### NOTIFICATION RELATING TO PRIORITY CLAIM

(PCT Rules 26bis.1 and 26bis.2 and *Administrative Instructions*, Sections 402(c) and 409)

To:

JOCHMAN, Joseph, J.
Andrus, Sceales, Starke & Sawall, LLP
100 East Wisconsin Avenue
Suite 1100
Milwaukee, WI 53202
United States of America

| Date of mailing (day/month/year) | |
|---|---|
| 07 June 2005 (07.06.2005) | |
| **Applicant's or agent's file reference** | **IMPORTANT NOTIFICATION** |
| 4848-00331 | |
| **International application No.** | **International filing date (day/month/year)** |
| PCT/US2005/000297 | 06 January 2005 (06.01.2005) |
| **Applicant** | |
| KOSS CORPORATION et al | |

The applicant is hereby notified of the following in respect of the priority claim(s) made in the international application.

1. [X] **Correction of priority claim.** In accordance with the applicant's notice received on: 12 April 2005 (12.04.2005), the following priority claim has been corrected, according to paragraph 178 of the PCT Receiving Guidelines where application, to read as follows:

US 05 January 2005 (05.01.2005) 11/029,911

- [ ] even though the indication of the number of the earlier application is missing.
- [ ] even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:

2. [ ] **Addition of priority claim.** In accordance with the applicant's notice received on: , the following priority claim has been added:

- [ ] even though the indication of the number of the earlier application is missing.
- [ ] even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:

3. [ ] As a result of the correction and/or addition of (a) priority claim(s) under items 1 and/or 2, the (earliest) priority date is:

4. [ ] **Priority claim considered not to have been made.**

- [ ] The applicant failed to respond to the invitation under Rule 26bis.2(a) (Form PCT/IB/316) within the prescribed time limit.
- [ ] The applicant's notice was received after the expiration of the prescribed time limit under Rule 26bis.1(a).
- [ ] The applicant's notice failed to correct the priority claim so as to comply with the requirements of Rule 4.10.

The applicant may, before the technical preparations for international publication have been completed and subject to the payment of a fee, request the International Bureau to publish, together with the international application, information concerning the priority claim. See Rule 26bis.2(c) and the PCT Applicant's Guide, Volume I, Annex B2(IB).

5. [ ] Where multiple priorities have been claimed, the above item(s) relate(s) to the following priority claim(s):

6. A copy of this notification has been sent to the receiving Office and

- [ ] to the International Searching Authority (where the international search report and the written opinion of the International Searching Authority have not yet been issued).
- [ ] the designated Offices (in accordance with Rule 93bis).

| The International Bureau of WIPO<br>34, chemin des Colombettes<br>1211 Geneva 20, Switzerland | Authorized officer<br>François BAECHLER (fax 338-7090) |
|---|---|
| Facsimile No. (41-22) 338.70.90 | Telephone No. (41-22) 338 9544 |

Form PCT/IB/318 (January 2004)

006711816

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

# PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To:
ANDRUS SCEALES STARKE & SAWALL LLP
Attn. Jochman, Joseph J.
100 East Wisconsin Avenue
Suite 1100
Milwaukee, Wisconsin 53202
UNITED STATES OF AMERICA

| | |
|---|---|
| Date of mailing (day/month/year) | 26/04/2005 |
| Applicant's or agent's file reference: 4848-00331 | FOR FURTHER ACTION See paragraphs 1 and 4 below |
| International application No.: PCT/US2005/000297 | International filing date (day/month/year) 06/01/2005 |
| Applicant: KOSS CORPORATION | |

1. [x] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   **Filing of amendments and statement under Article 19:**
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   **When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

   **Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 740.14.35

   **For more detailed instructions,** see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

| Name and mailing address of the International Searching Authority | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Matthew Davis |

## NOTES T FORM PCT/ISA/220

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These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

## INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

**What parts of the international application may be amended?**

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

**When?** Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

**Where not to file the amendments?**

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

**How?** Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

**What documents must/may accompany the amendments?**

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

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The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

**The following examples illustrate the manner in which amendments must be explained in the accompanying letter:**

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

**"Statement under article 19(1)" (Rule 46.4)**

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

**It must be in the language in which the international application is to be published.**

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

**Consequence if a demand for international preliminary examination has already been filed**

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

**Consequence with regard to translation of the international application for entry into the national phase**

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.



BNSDOCID <XS____ISA220NOENP4_I_>

PATENT COOPERATION TREATY

# PCT

## INTERNATI NAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| Applicant's or agent's file reference 4848-00331 | FOR FURTHER ACTION | see Form PCT/ISA/220 as well as, where applicable, item 5 below. |
|---|---|---|
| International application No. PCT/US2005/000297 | International filing date *(day/month/year)* 06/01/2005 | (Earliest) Priority Date *(day/month/year)* 09/01/2004 |
| Applicant KOSS CORPORATION | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      [ ] The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. [ ] With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. [ ] Certain claims were found unsearchable (See Box II).

3. [ ] Unity of invention is lacking (see Box III).

4. With regard to the title,
   [X] the text is approved as submitted by the applicant.
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the abstract,
   [X] the text is approved as submitted by the applicant.
   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,
   a. the figure of the drawings to be published with the abstract is Figure No. 1
      [X] as suggested by the applicant.
      [ ] as selected by this Authority, because the applicant failed to suggest a figure.
      [ ] as selected by this Authority, because this figure better characterizes the invention.
   b. [ ] none of the figures is to be published with the abstract.

# INTE' 'ATI NAL SEARCH REPORT

national Application No
PCT/US2005/000297

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/05 H04M1/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 2002/173346 A1 (WANG CHIN-YANG)<br>21 November 2002 (2002-11-21)<br><br>abstract<br>paragraphs '0007!, '0012! - '0015!<br>figures 1,2 | 1-12,15,<br>18-27,<br>30,33 |
| A | | 13,14,<br>28,29 |
| A | US 5 457 751 A (SUCH ET AL)<br>10 October 1995 (1995-10-10)<br>abstract | 1,33 |
| A | US 6 519 345 B1 (YANG CHIN-HUI)<br>11 February 2003 (2003-02-11)<br>abstract<br>figures 2,6 | 2,3,7,<br>18,20,33 |

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 15 April 2005 | 26/04/2005 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax (+31-70) 340-3016 | Pohl, M |

Form PCT/ISA/210 (second sheet) (January 2004)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | WO 03/055183 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD; FUNAYAMA, TOSHIYUKI; ITO, MAM) 3 July 2003 (2003-07-03) abstract | 6,11,23, 26 |
| A | US 6 018 585 A (AKINO ET AL) 25 January 2000 (2000-01-25) abstract page 1, lines 15,19,20 | 16,17, 31,32 |
| A | EP 1 223 682 A (TELEFONAKTIEBOLAGET L M ERICSSON) 17 July 2002 (2002-07-17) abstract paragraphs '0009! - '0019!; figures 1-4 | 1-33 |

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/000297

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17,33

A hands-free personal communication device for wearing about a user's neck, comprising an elongated elastic neckband having memory characteristic, an acoustic output device and a microphone.

1.1. claims: 18-32

A hands-free personal communication device for wearing about a user's neck, comprising an elongated elastic neckband, an acoustic output device and an earphone.

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 2002173346 A1 | 21-11-2002 | TW 496645 Y | 21-07-2002 |
| | | DE 20110379 U1 | 04-10-2001 |
| US 5457751 A | 10-10-1995 | NONE | |
| US 6519345 B1 | 11-02-2003 | DE 20014762 U1 | 07-12-2000 |
| WO 03055183 A | 03-07-2003 | JP 2003188985 A | 04-07-2003 |
| | | WO 03055183 A1 | 03-07-2003 |
| US 6018585 A | 25-01-2000 | JP 9205693 A | 05-08-1997 |
| EP 1223682 A | 17-07-2002 | EP 1223682 A1 | 17-07-2002 |
| | | AT 250828 T | 15-10-2003 |
| | | DE 60005543 D1 | 30-10-2003 |

# ATENT COOPERATION TRI TY

63

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
*(day/month/year)* see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

**FOR FURTHER ACTION**
See paragraph 2 below

| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
|---|---|---|
| PCT/US2005/000297 | 06.01.2005 | 09.01.2004 |

International Patent Classification (IPC) or both national classification and IPC
H04M1/05, H04M1/60

Applicant
KOSS CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized Officer

Pohl, M

Telephone No. +49 89 2399-7367

**WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY**

International application No. PCT/US2005/000297

**Box No. I Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ in written format

      ☐ in computer readable form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in computer readable form.

      ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY**

International application No. PCT/US2005/000297

## Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:

   ☐ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ not paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   **see separate sheet**

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☒ all parts.

   ☐ the parts relating to claims Nos.

## Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 1-33 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | |
| | No: | Claims | 1-33 |
| Industrial applicability (IA) | Yes: | Claims | 1-33 |
| | No: | Claims | |

2. Citations and explanations

   **see separate sheet**

**WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2005/000297

**Box No. VII Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

Reference is made to the following documents:

D1: US 2002/173346 A1 (WANG CHIN-YANG) 21 November 2002 (2002-11-21)
D2: US-A-5 457 751 (SUCH ET AL) 10 October 1995 (1995-10-10)
D3: US-B1-6 519 345 (YANG CHIN-HUI) 11 February 2003 (2003-02-11)
D4: US-A-6 018 585 (AKINO ET AL) 25 January 2000 (2000-01-25)
D5: WO 03/055183 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD; FUNAYAMA, TOSHIYUKI; ITO, MAM) 3 July 2003 (2003-07-03)

**Re Item IV**
**Lack of unity of invention**

The application lacks unity within the meaning of Rule 13.1 PCT for the following reasons:

1. The present application contains three independent claims relating to an apparatus (claims 1, 18 and 33). According to Rule 13.1 PCT, a plurality of independent claims of the same category must relate to one invention only or to a group of inventions so linked as to form a single general inventive concept (Rule 13.2 EPC). Such a single inventive concept cannot be found in the present claims, which can be subdivided into two groups:

**Group I** (claims 1 to 17 and 33):

A hands-free personal communication device for wearing about a user's neck, comprising an elongated elastic neckband having memory characteristic, an acoustic output device and a microphone.

**Group II** (claims 18 to 32):

A hands-free personal communication device for wearing about a user's neck, comprising an elongated elastic neckband, an acoustic output device and an earphone.

**WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/US2005/000297

2. The **common features**, which are already disclosed by document **D1** (the references in parentheses applying to this document), are

> *a hands-free personal communication device* (fig. 1) *for wearing about a user's neck* (fig. 2), *the communication device comprising an elongated elastic neckband* (1) *for supporting the communication device about the user's neck and an acoustic output device* (3) *attached* (31) *to the neckband an positionable near an ear of the user when the communication device is worn about the user's neck* (fig. 2).

The common features are therefore not novel.

3. The remaining **special technical features** of the two groups of inventions are therefore represented by:

**Group I:**

> A neckband having memory characteristic and the provision of a microphone.
>
> The subject-matter of the first group deals with the **problem** of adjusting a hands-free device and transmitting a user's voice. The **technical effect** is that of being able to make a hands-free device fit to various body proportions and to use the device to transmit voice data.

**Group II:**

> An earphone attached to an end of the neckband.
>
> The subject-matter of the second group deals with the **problem** of allowing private conversations with a hands-free device. The **technical effect** is that third parties cannot listen to conversations.

These remaining features are not the same or corresponding and aim to solve different problems.

4. Since the aforementioned remaining features have nothing relevant in common, i.e. the subject-matter of the respective group of claims refer to different specific technical features without any relationship with respect to each other and aim to solve independent specific problems, no single general concept linking the different inventions can be seen. Hence, the application contains two inventions and lacks unity within the meaning of Rule 13.1 PCT.

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1, 18 and 33 does not involve an inventive step in the sense of Article 33(3) PCT.

1.1 The document **D1** is regarded as being the closest prior art to the subject-matter of **claim 1**, and discloses (the references in parentheses applying to this document) a hands-free personal communication device (fig. 1) for wearing about a user's neck (fig. 2), the communication device comprising:
an elongated elastic neckband (1) for supporting the communication device about the user's neck,
an acoustic output device (3) attached (31) to the neckband (1) and positionable near an ear of the user when the communication device is worn about the user's neck (fig. 2); and
a microphone (2) attached to a first end of the neckband.

The subject-matter of claim 1 therefore **differs** from this known hands-free device in that it additionally specifies memory characteristics of the neckband allowing to form the neckband into various selectable positions.

The **technical effect** provided by this difference, is the possibility to adapt a neckband to different body proportions.

The **problem** to be solved by the present invention may therefore be regarded as how to make a neckband adjustable to varying body proportions.

The **solution**, however, is considered a straight forward implementation of known bendable materials with a memory effect, as e.g. disclosed in document **D2** (cf. abstract; *"the support means ... is ... U-shaped, and may be further shaped, such that it generally conforms to the user's neck"*) which shows a similar headset.

The person skilled in the art would therefore, without the need to exercise any inventive activity, employ a material with memory effect for the neckband disclosed in D1 and arrive at the subject-matter of claim 1.

As a consequence, the subject-matter does not involve an inventive step (Article 33(3) PCT) and does therefore not meet the requirements of Article 33(1) PCT.

1.2 The document **D1** is regarded as being the closest prior art to the subject-matter of independent **claim 18**, and discloses (the references in parentheses applying to this document) a hands-free personal communication device (fig. 1) for wearing about a user's neck (fig. 2), the communication device comprising:
an elongated elastic neckband (1) for supporting the communication device about the user's neck, and
an acoustic output device (3) attached (31) to the neckband (1) and positionable near an ear of the user when the communication device is worn about the user's neck (fig. 2).

The **difference** between the disclosure of D1 and the subject-matter of claim 18 is the provision of an earphone attached to an end of the neckband, the earphone being detachable from the neckband and insertable into an ear of the user when the communication device is worn about the user's neck.

The **technical effect** brought about by this difference is the ability to listen to telephone conversations in private.

The **problem** to be solved can therefore be formulated as providing a user with means for having a conversation without third parties listening.

The **solution**, however, although implemented in a slightly different way, is considered to be anticipated by document D1, which foresees an engaging hole for an earplug (cf. paragraph [0015]; *"the receiver ... can provide an engaging hole ... for connecting with an earphone wire"*).

As a consequence, the subject-matter of claim 18 does not involve an inventive step (Article 33(3) PCT) and does therefore not meet the requirements of Article 33(1) PCT.

1.3 The same argumentation applies to the subject-matter of independent **claim 33**, which, in addition to the subject-matter defined in claim 18, specifies the use of a material with *"memory characteristics"*.

However, as already outlined in paragraph 1.1 above, the use of a material with memory characteristics is considered to fall within the choice of options obvious to a person skilled in the art, therefore not providing anything of inventive significance.

As a consequence, the subject-matter of claim 33 lacks an inventive step (Article 33(3) PCT) and does therefore not meet the requirements of Article 33(1) PCT.

2. Dependent **claims 2 to 17 and 19 to 32** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see documents **D1 to D5** and the corresponding passages cited in the search report.

3. The subject-matter defined in **claims 1 to 33** is, however, industrially applicable (Article 33(4) PCT).

**Re Item VII**

**Certain defects in the international application**

1. The reference to the *"device of claim 1"* in dependent **claim 30** appears to be wrong an should have referred to claim **18** instead.

2. The application number cited in paragraph 5 of the description should have been replaced by the publication number in order to facilitate retrieval by the public.

US006519345B1

(12) **United States Patent**
**Yang**

(10) **Patent No.: US 6,519,345 B1**
(45) **Date of Patent: Feb. 11, 2003**

(54) **DOUBLE-FUNCTIONED HAND-FREE DEVICE FOR CELLULAR TELEPHONE**

(76) *Inventor:* **Chin-Hui Yang**, No. 139, Pai-Liu Street, Chi-Tu Dist., Keelung (TW)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 340 days.

(21) Appl. No.: **09/636,768**

(22) Filed: **Aug. 14, 2000**

(51) **Int. Cl.**[7] ..... **H04R 25/00**
(52) **U.S. Cl.** ..... 381/151; 381/326; 381/380
(58) **Field of Search** ..... 381/151, 326, 381/380, 190, 355, FOR 130; 379/430, 433.02, 433.03

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 2,463,786 A | * | 3/1949 | Lybarger | 381/151 |
| 2,678,973 A | * | 5/1954 | Newman | 381/151 |
| 5,778,079 A | | 7/1998 | Wun | |
| 6,141,427 A | * | 10/2000 | Fukuda | 381/151 |
| 6,389,140 B1 | * | 5/2002 | Wei | 381/326 |

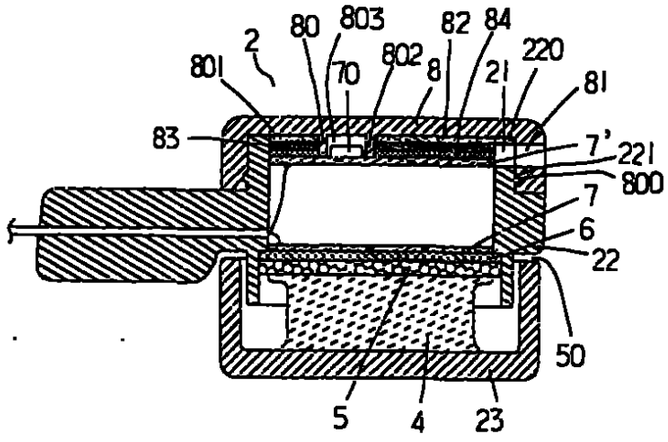
* cited by examiner

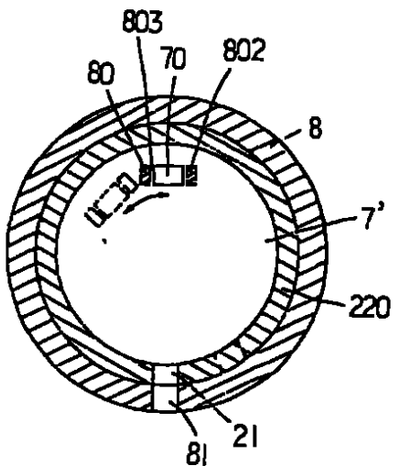
*Primary Examiner*—Curtis Kuntz
*Assistant Examiner*—Suhan Ni
(74) *Attorney, Agent, or Firm*—Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

A double-functioned hand-free device for cellular telephone comprises a microphone casing having one end connected with a neck hanger, wherein a direct sound-receiver circuit and a circuit for sensing vibration of vocal cords are housed in the microphone casing; and a slew cover on the microphone casing is provided for control and switch the circuits alternatively to meet on-the-spot requirements.

**2 Claims, 5 Drawing Sheets**



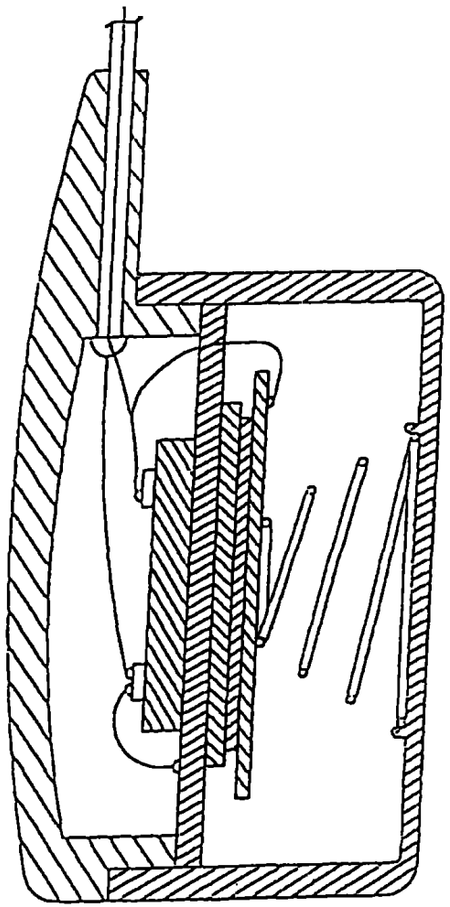


FIG. 1
PRIOR ART

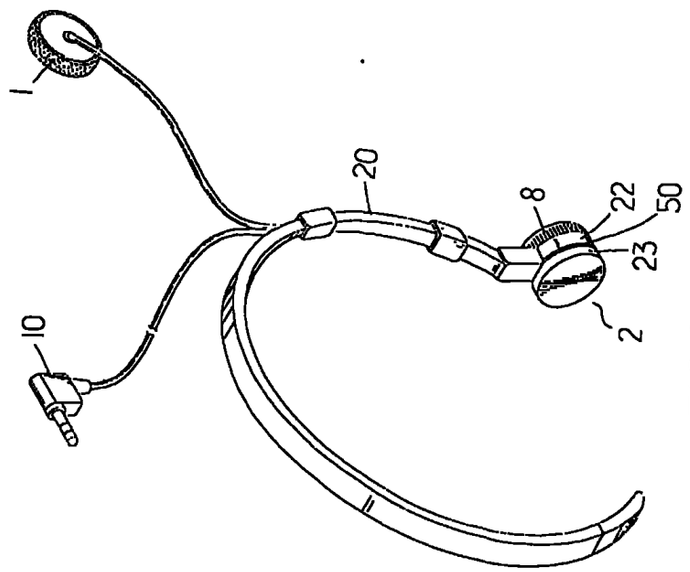



FIG. 2

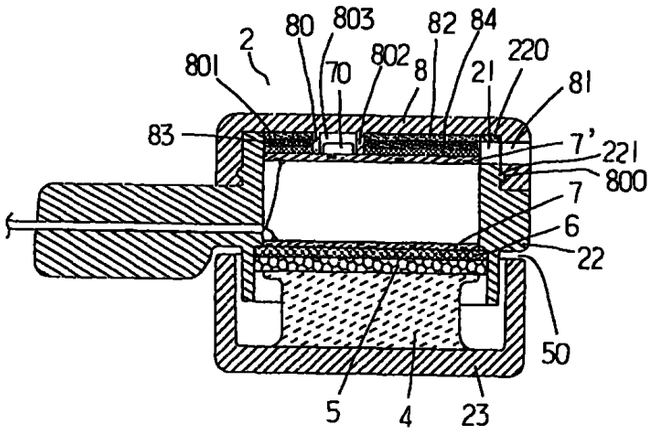

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FIG. 3

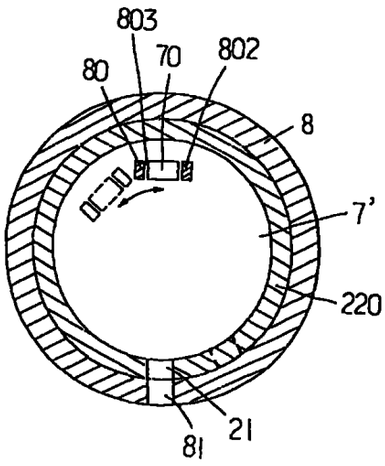
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FIG. 5

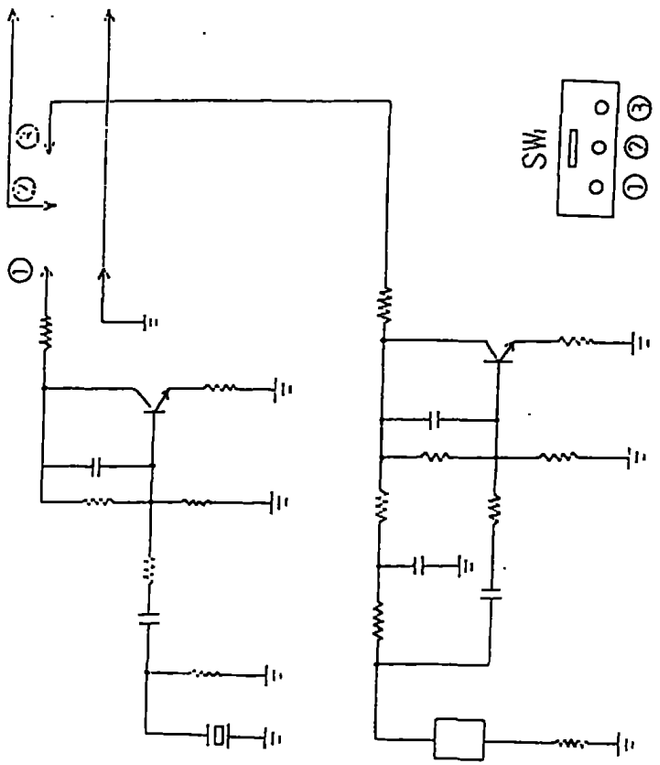


FIG. 4

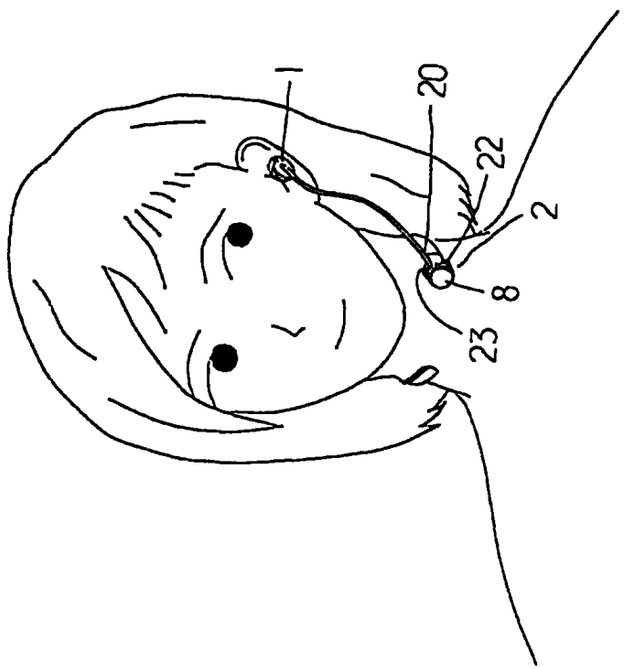


FIG. 6

# DOUBLE-FUNCTIONED HAND-FREE DEVICE FOR CELLULAR TELEPHONE

## BACKGROUND OF THE INVENTION

A suspended microphone for cellular telephone disclosed in a mono-functioned U.S. Pat. No. 5,778,079 shown in FIG. 1 is used to sense vibration of a user's vocal cords during vocal communication. The sensed vibration is then forwarded to a processing circuit for amplification via a spring. In this case, the spring, as a transmission medium, has a considerable open space with a limited transmission capability that could distort fidelity and weaken vibration amplitude of vocal cords to indistinguishable degree occasionally.

In view of abovesaid imperfection, the inventor of this invention is to provide an improved mechanism pertaining to the subject matter in the hope that it would be helpful in some respects to people's daily living.

## SUMMARY OF THE INVENTION

The primary object of this invention is to provide a double-functioned hand-free device for cellular telephone, a microphone thereof is capable of collecting sound wave directly or sensing vibration of vocal cords.

In order to realize abovesaid object, this invention is characterized in:

a neck hanger connected with one end of a microphone casing which is attached to a user's throat portion; two circuits housed in the microphone casing including a direct sound-receiver circuit and a circuit for sensing vibration of vocal cords; a switch controlled by a turnable slew cover on the microphone casing for switching between those two circuits alternatively; and a sound-receiver hole being driven to open or close by turning the slew cover to meet on-the-spot requirements.

For more detailed information regarding this invention together with further advantages or features thereof, at least an example of preferred embodiment will be elucidated below with reference to the annexed drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

The related drawings in connection with the detailed description of this invention, which is to be made later, are described briefly as follows, in which:

FIG. 1 is a schematic plane view of a conventional microphone assembly;

FIG. 2 is a schematic three-dimensional view of this invention;

FIG. 3 is a cutaway sectional view of a microphone of this invention;

FIG. 4 is a sound-transmitter circuit of this invention;

FIG. 5 is a schematic view showing that when a sound-receiver hole of the microphone of this invention is opened or closed; and

FIG. 6 is a disposition diagram of this invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As illustrated in FIGS. 2 and 3, a double-functioned hand-free device for cellular telephone of this invention comprises an earphone 1, a plug 10, a microphone casing 2, and a neck hanger 20. The microphone casing 2 having one end connected with the neck hanger 20 is composed of an upper and a lower shell 22, 23, wherein the lower shell 23 is coupled to a sounding element 5, rubber-made element for example, through an interposed sponge body 4, and is separated from the upper shell 22 by a slit 50.



Moreover, a damper layer 6 with a sound-transmitter circuit 7 attached thereon is resided on the sounding element 5 for secluding noise. The sound-transmitter circuit 7 (shown in FIG. 4) further comprises some known components or circuits, including a metallic conductive piece, an upper and a lower piezoelectric ceramic piece, a circuit board, an amplifier, etc, without needing reiteration here, and is communicable with a sound-receiver circuit 7' housed in a turnable slew cover 8 at the top end of the upper shell 22. The vibration-transmitter circuit 7 and the sound-receiver circuit 7' are controlled and selected by a switch 70.

A plurality of arcuate flanges 221 is disposed on a top edge 220 of the upper shell 22 oppositely for engaging with correspondent arcuate grooves 800 formed in the inner wall of the turnable slew cover 8, and a through hole 21 is perforated in the top edge 220 of the upper shell 22 above one of the arcuate flanges 221, wherein a recessed face 801 in the slew cover 8 is extended to form a left and a right stopper 80, 802 and a middle space 803 for positioning the switch 70, adjacent to the left end of the recessed face 801 according to FIG. 3.

A sound-receiver hole 81 is arranged at a lateral wall of the slew cover 8 corresponding to the through hole 21 in the upper shell 22 of the microphone casing 2 for secluding outside noise. Meanwhile, on the recessed face 801, from the upper end to the lower, a sponge layer 82, a sounding layer 83 (rubber-made for example), a damper layer 84 for secluding noise, and another sound-receiver circuit 7' are stepwise overlapped, wherein the switch 70 on the other sound-receiver 71 is interacted with and controlled by the stopper 80, 802 extended from the recessed face 801 of the turnable slew cover 8. (As the sound-receiver circuit 7' is composed of known components including a metallic conductive piece, an upper and a lower piezoelectric ceramic piece, a circuit board, an amplifier, etc, shown in FIG. 4, it won't be reiterated herein.)

After the neck hanger 20 is placed on his/her neck and the lower shell 23 of the microphone casing 2 is attached to his/her throat portion as shown in FIG. 6, the slew cover 8 is turned to have the switch 70 switched to select the vibration-transmitter circuit 7, and have the lower shell 23 closed and the sound-receiver hole 81 turned staggeringly to the through hole 21 in the upper shell 22 for secluding outside noise in the case sensing of vocal-cord vibration is desired. On the contrary, for direct sound-transmission, abovesaid operation is inverted to have the sound-receiver circuit selected, the sound-receiver hole 81 opened to link with the through hole 21 (shown in FIG. 5).

In short, the merits of this invention may be summarized as the following:

1. A double function for receiving both vibration wave and sound wave is endued to this invention for meeting different requirements.

2. The turnable slew cover is designed to drive the switch and open or close the sound-receiver hole for secluding outside noise if desired.

3. As the turnable slew cover is disposed on the microphone casing, it is particularly convenient for manipulative operation.

Although, this invention has been described in terms of preferred embodiments, it is apparent that numerous variations and modifications may be made without departing

from the true spirit and scope thereof, as set forth in the following claims.

What is claimed is:

1. A double-functioned hand-free device for cellular telephone comprising:

a microphone casing, comprising an upper and a lower shell, having one end connected to a neck hanger;

a plurality of circuits housed in the microphone casing, including a direct sound-receiver circuit and a circuit for sensing vibration of vocal cords; and

a switch controlled by an interactive stopper of a turnable slew cover, wherein the slew cover is disposed on the microphone casing for control opening or closing of a sound-receiver hole therein synchronously to permit it to communicate or not with a through hole of the microphone casing for direct sound-communication or vibration-transmission of vocal cords so as to meet on-the-spot requirements.

2. The double-functioned hand-free device for cellular telephone according to claim 1, wherein the upper shell and the slew cover are combined by jointing a plurality of arcuate flanges with corresponding arcuate grooves.

* * * * *

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Wang (43) Pub. Date: Nov. 21, 2002

78

(54) NECK PHONE

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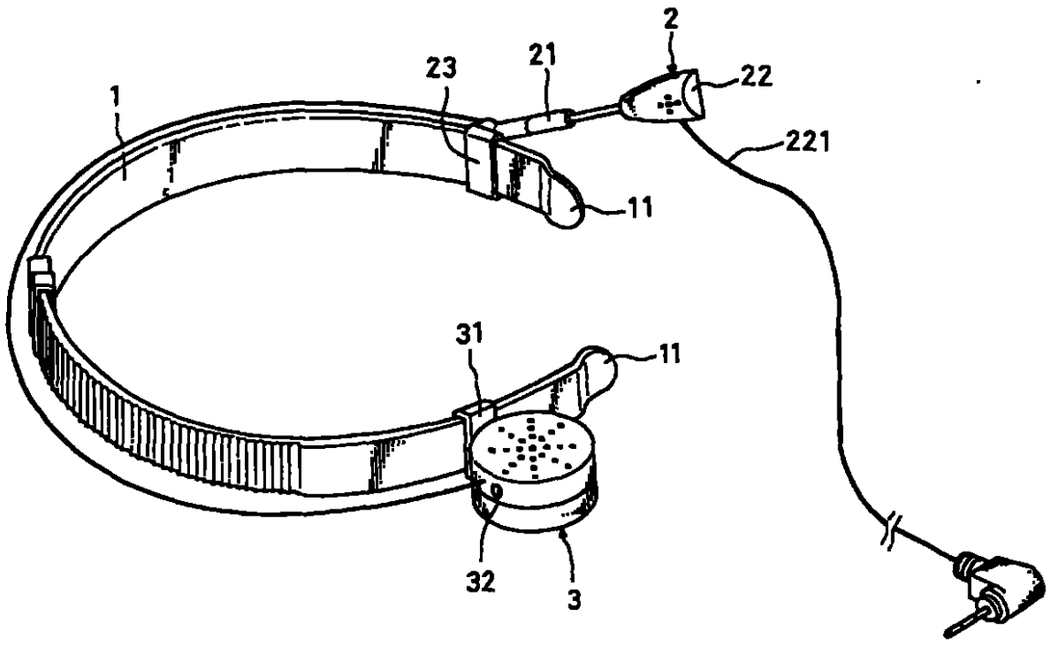
(51) Int. Cl.[7] ..... H04M 1/00

(52) U.S. Cl. ..... 455/568; 455/569; 455/575

(57) ABSTRACT

A neck phone comprises a hanging band, and a transmitter. The hanging band provides a shape of an open loop. The transmitter is a microphone with a connecting rod to be joined to one of two ends of the hanging band and having an electric wire with a plug fitting with a socket in a mobile phone. The receiver is a speaker connected to another end on the hanging band and has another electric wire with another plug for fitting with the socket in a mobile phone. When the hanging band is hung on the neck of a user, the user can transmit a call and receive incoming sound signal.



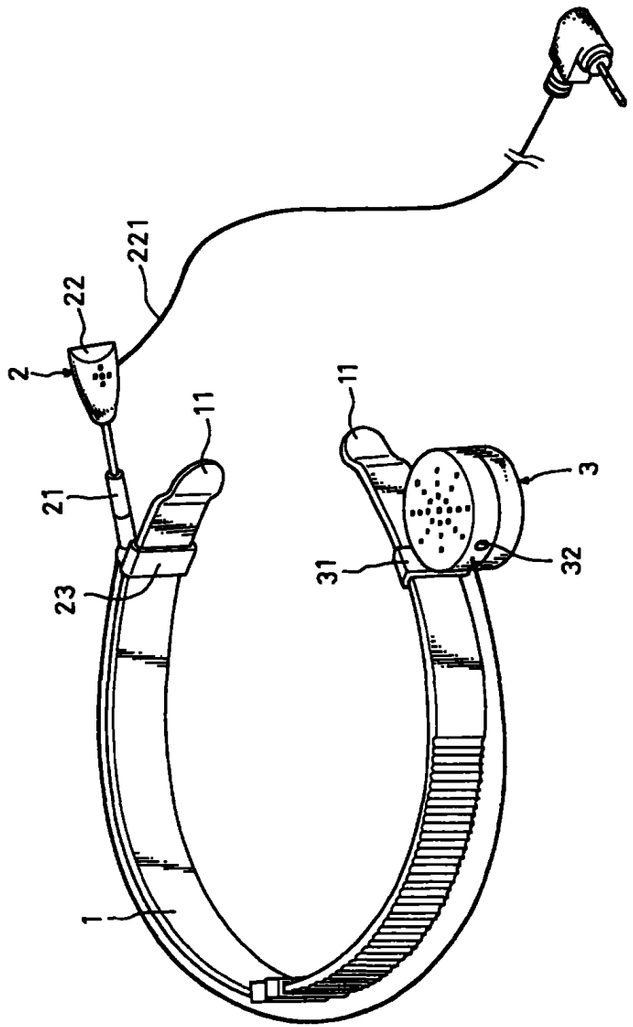



FIG. 1

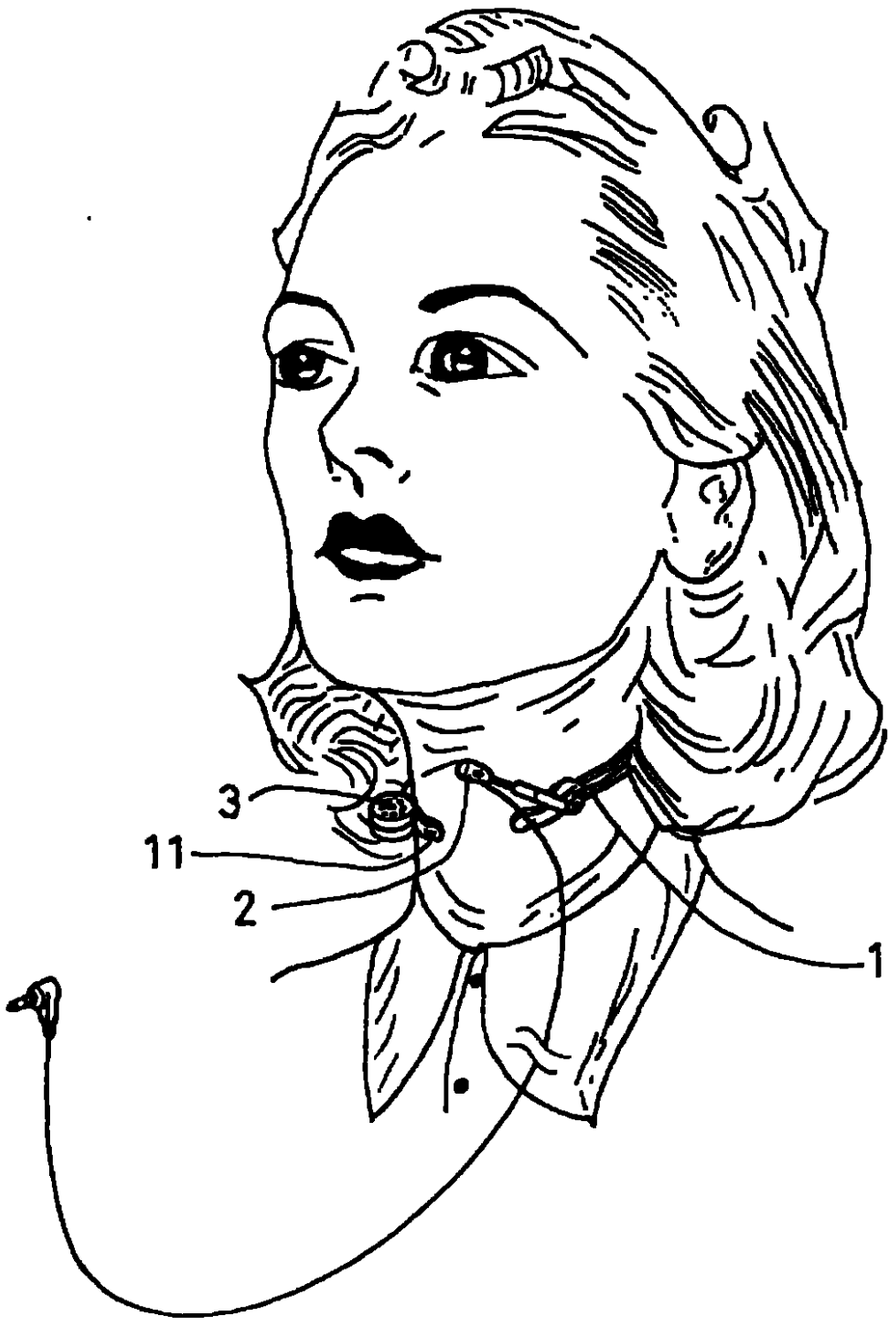



FIG. 2

# NECK PHONE

## BACKGROUND OF THE INVENTION

[0001] 1. Field of The Invention

[0002] The present invention relates to a neck phone, and, particularly, to a hanging band with a transmitter and a receiver, which is possible to be hung on the neck of a user to perform a function of phone set.

[0003] 2. Description of Related Art

[0004] A mobile phone has brought us a great convenience because it is possible for us to transmit messages wherever and whenever, that is, a phone call can be made or received without being limited by the time and the location. Hence, it is greatly helpful for a business communication or a personal conversation. This is why the mobile phone is so popularly used since it has been available in the market.

[0005] However, the mobile phone brings us certain side effect also. For instance, it is not safe that using the mobile phone during driving a car on the road so that some of the countries have legislated against the mobile phone being held for transmitting or receiving phone calls during a drive.

[0006] Accordingly, a handset free transmitter-receiver has been developed for the user to comply with the legislation. The conventional handset free transmitter-receiver provides a band as the headphone does with an end thereof having a flat earphone covering an ear and the other end thereof having a transmitter such as a microphone. Although the loudspeaker in a car can be used instead of the earphone as an output, mostly the type of the band over the head with the earphone covering the ear microphone is used much earlier and more popular.

[0007] Shortcomings of the headphone are that the band covering the head with the earphone covering the ear may disturb the hairstyle and result in an uncomfortable ear muscle. It is more serious that it may leads to a stagnation of the industrial technology once the type of headphone is kept using without any change.

## SUMMARY OF THE INVENTION

[0008] An object of the present invention is to provide a neck phone, which has a hanging band with two ends thereof to fit with the neck of a user snugly to overcome the shortcomings of the headphone.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present invention can be more fully understood by referencing to the following description and accompanying drawings, in which:

[0010] FIG. 1 is a perspective view of a headphone according to the present invention; and

[0011] FIG. 2 is a perspective view illustrating the headphone in use.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Referring to FIGS. 1 and 2, the creativeness of a neck phone according to the present invention basically resides in that the neck phone has transmitting and the receiving parts thereof properly accommodate to the mouth and the ear of a person respectively as soon as the neck phone is hung on the neck of the person. Accordingly, the neck phone of the present invention comprises a hanging band 1, a transmitter 2, and a receiver 3.

[0013] Wherein, the hanging band 1 has a shape of open loop such that it is possible to be hung on the neck as shown in FIG. 2. Further, the hanging band 1 can be designed to provide double sections as shown in FIG. 1 such that the width or the loop diameter is adjustable. It is noted that the design of double sections for the hanging band is prior art so that no detail with regard to the design will be described. In order to touch the neck snugly, both ends of the hanging band have an inward bend to constitute a touching pierce 11 respectively.

[0014] The transmitter 2 is composed of a microphone 2 with a connecting rod 21 and is attached to the hanging band 1 at an end part thereof by way of an engaging device 23. The engaging device 23 illustrated in FIG. 1 is a clip, but it is only an example not for a limitation. The connecting rod 21 can move pivotally with respect to the hanging band 1 for an angular adjustment, for instance, by way of an adjustable screw as shown in FIG. 1. The microphone 22 provides an electric wire 221 with a plug for connecting with a mobile phone. This is also belongs to prior art and no detail will be described.

[0015] The receiver 3 is a speaker and can be connected to another end part of the hanging band 1 by way of a joining device 31 movably or fixedly. The joining device 31 is a clip shown in FIG. 1, but it is only for taking an example and not a limitation. The receiver 3 also provides an electric wire with a plug for connecting with the mobile phone. In order to intensify the power and to last the output, a conventional power source can be added. In addition, the receiver 3 can provide an engaging hole 32 for connecting with an earphone wire such that a earphone can be used for receiving phone calls instead as soon as the power becomes weak. The engaging hole 32 has a required circuit therein for transmitting the sound signal.

[0016] Referring to FIGS. 1 and 2 again, as soon as the neck phone of the present invention is worn, the hanging band 1 is hung on the neck of a user such that the receiver 3 can be located next to one of the ears and the transmitter 2 can be located next to the mouth. Thus, the operation of transmitting or receiving call can be performed without any assistance of a hand conveniently. In addition, while the neck phone is used, the hairstyle cannot be disturbed as the conventional headphone does.

[0017] While the invention has been described with reference to preferred embodiments thereof, it is to be understood that modifications or variations may be easily made without departing from the spirit of this invention, which is defined in the appended claims.

What is claimed is:

1. A neck phone, comprising:

a hanging band, providing a shape of an open loop with two ends;

a transmitter, being a microphone with a connecting rod being joined to one of the ends of the hanging band, and having an electric wire with a plug fitting with a socket in a mobile phone; and

a receiver, being a speaker connected to another end of the hanging band, and having a another electric wire with another plug for fitting with the socket in a mobile phone;

whereby, when hanging band is hung on the neck of a user, the user can operate to transmit a call and receive incoming signal.

2. The neck phone according to claim 1, wherein an engaging device joins the connecting rod to the hanging band, and another engaging device joins the receiver to the hanging band.

3. The neck phone according to claim 1, wherein the connecting rod can move pivotally with respect to the hanging band.

4. The neck phone according to claim 1, wherein the receiver may provide an electrically connected socket for being inserted by an earphone.

5. The neck phone according to claim 1, wherein the receiver may be added a power source.

6. The neck phone according to claim 1, wherein the hanging band is composed of band sections with an adjustable length.

7. The neck phone according to claim 1, wherein the two ends of the hanging band may provided with a bend to constitute a touching piece respectively.

* * * * *

US006018585A

# United States Patent [19]

Akino et al.

[11] Patent Number: 6,018,585

[45] Date of Patent: Jan. 25, 2000

[54] **WATERPROOF MICROPHONE**

[75] Inventors: Hiroshi Akino; Satoshi Uchimura, both of Sagamihara, Japan

[73] Assignee: Kabushiki Kaisha Audio-Technica, Tokyo, Japan

[21] Appl. No.: 08/957,105

[22] Filed: Oct. 24, 1997

[51] Int. Cl.[7] ..... H04R 25/00

[52] U.S. Cl. ..... 381/355; 381/355; 381/189; 128/201.19

[58] Field of Search ..... 128/201.19; 381/355, 381/345, 391, 189, 410, 344, 334

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*Primary Examiner*—Paul Loomis
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*Attorney, Agent, or Firm*—Welsh & Katz, Ltd.

[57] **ABSTRACT**

A waterproof microphone according to the present invention includes a case; an acoustic terminal unit having a front acoustic terminal and a rear acoustic terminal to be accommodated in the case through a unit holder and a unit case; waterproof films in the case for covering the front acoustic terminal and the rear acoustic terminal of the acoustic terminal unit, respectively; the waterproof films being deformed at a predetermined water pressure; and restraining means provided between said acoustic terminal unit and said waterproof films for restraining the deformation of each said waterproof films, so that the thickness and shape of the waterproof films can be each adjusted.

12 Claims, 1 Drawing Sheet

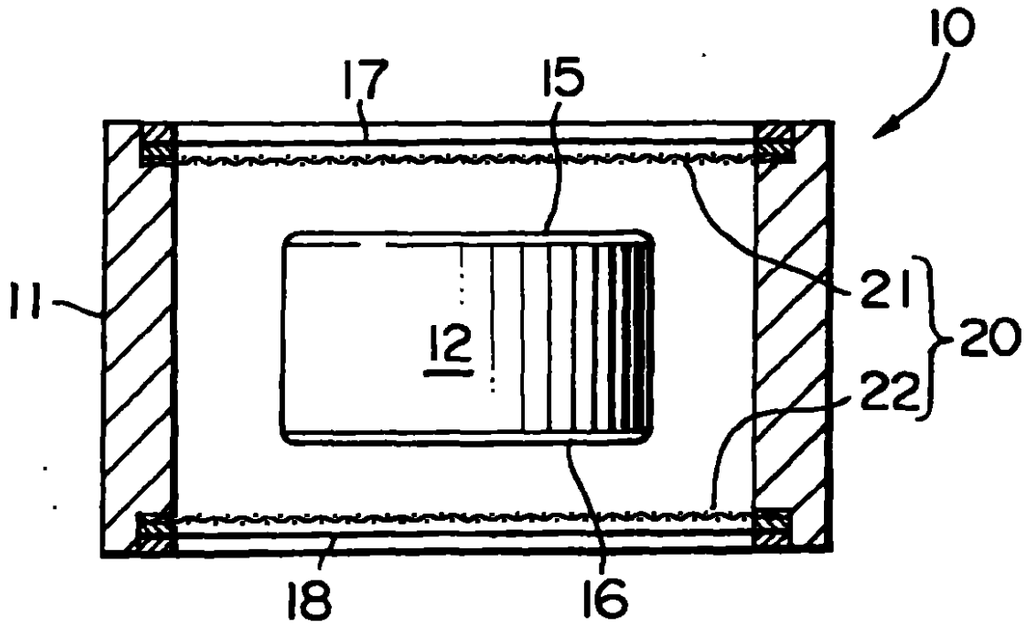


FIG. 1

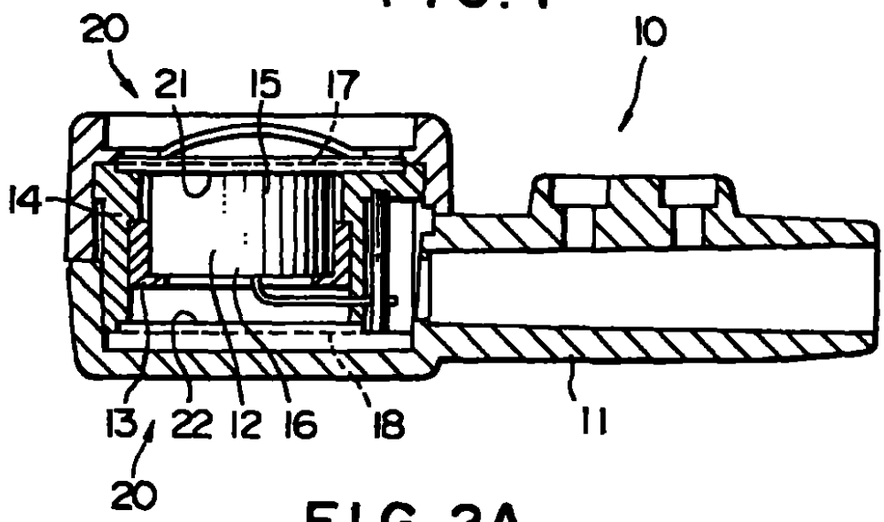



FIG. 2A

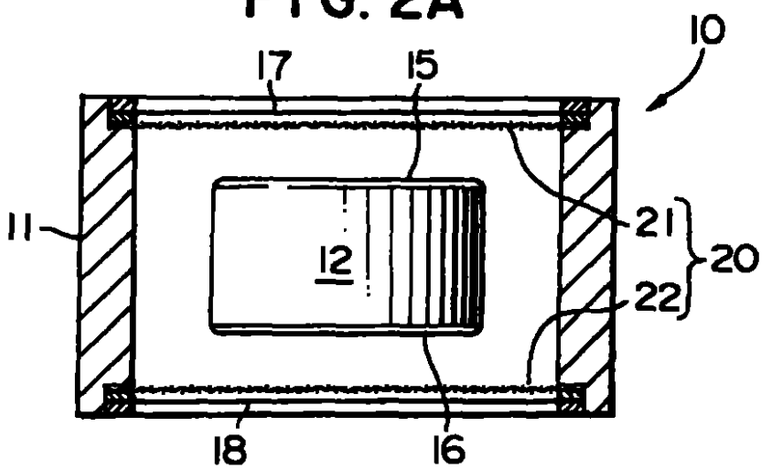
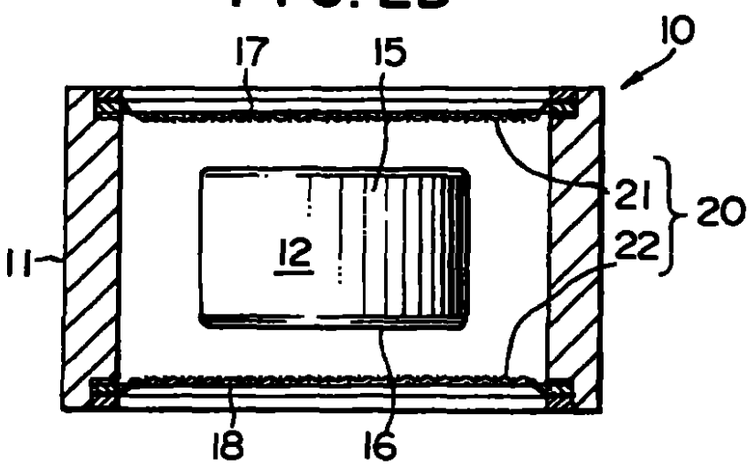



FIG. 2B



# WATERPROOF MICROPHONE

## FIELD OF THE INVENTION

The present invention relates to a waterproof microphone capable enhancing various properties while maintaining a water resistance.

## BACKGROUND OF THE INVENTION

In a waterproof microphone generally used, often, an acoustic terminal unit is covered with a waterproof film, for example, such as a plastic film, rubber, etc., on the supposition that a user erroneously drops it into water.

In this waterproof film is set to an appropriate shape and thickness so that it is not broken even if a fixed water pressure exerts thereto and returned to its original shape.

In the thus set waterproof microphone, a sound wave having passed transmitted the waterproof film arrives at the acoustic terminal unit.

Accordingly, for enhancing various properties such as the sensitivity, frequency responsiveness, etc. of the waterproof microphone, it is necessary to make the waterproof film as thin as possible.

## SUMMARY OF THE INVENTION

An object of the present invention is fulfilled with such the needs as described, and is to provide a waterproof microphone capable of maintaining a water resistance even if a thickness and a shape of a waterproof film is suitably set and of enhancing various properties.

The waterproof microphone according to the present invention comprises a case, an acoustic terminal unit encased into the case through a unit holder and a unit case, a waterproof film provided so as to cover a front acoustic terminal and a rear acoustic terminal of the acoustic terminal unit, and a control means provided so as to control deformation of the waterproof film between the acoustic terminal unit and the waterproof film.

In this case, as the control means, there can be employed the construction in which a rod-like member, a mesh or the like is arranged parallel with the waterproof film. These rod-like member, the mesh or the like may be arranged at a suitable position so that they come in contact with the waterproof film when the waterproof film is deformed due to the fixed water pressure to thereby control the deformation of the waterproof film uniformly.

With the constitution as described, since the deformation of the waterproof film is controlled uniformly by the control means, even if the user should drop the microphone into water erroneously, the waterproof film is not broken.

Accordingly, the shape, the thickness or the like of the waterproof film can be suitably set whereby various properties such as the sensitivity, the frequency responsiveness, etc. can be enhanced.

Further, in the case where the control means comprises the mesh arranged parallel with the waterproof film, the mesh acts as a diaphragm having a low acoustic impedance in normal use, thus not impeding various properties.

Further, in this waterproof microphone, the waterproof film comes in close contact with the mesh to form a number of small diaphragms which absorb sound in water.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view showing one embodiment of a waterproof microphone according to the present invention; and



FIGS. 2A and 2B are respectively schematic sectional views showing the function of a control means of the waterproof microphone shown in FIG. 1.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

One embodiment of the waterproof microphone according to the present invention will be explained hereinafter with reference to the drawings.

Referring to FIG. 1, a waterproof microphone 10 is used for a head-set which is used, for example, for a water aerobics.

The waterproof microphone 10 includes a case 11 connected to a stem of the head-set (not shown), and an acoustic terminal unit 12 encased in the case 11.

The acoustic terminal unit 12 is supported on the case through a unit holder 13 and a unit case 14. A front acoustic terminal 15 and a rear acoustic terminal 16 are covered with waterproof films 17 and 18, respectively.

The waterproof films 17 and 18 are formed into a predetermined shape by PET (polyethyleneterephtalate) having a thickness of 4 $\mu$m. Even if the waterproof microphone 10 is submerged into a predetermined depth, these waterproof films 17 and 18 are not deformed and broken due to the water pressure, and are restored to their original shape when water pressure is released.

A control means 20 for controlling deformation of the waterproof films 17 and 18 is provided between the acoustic terminal unit 12 and the waterproof films 17, 18.

The control means 20 comprises stainless steel meshes 21, 22 arranged parallel with the waterproof films 17, 18.

The stainless steel meshes 21, 22 have a wire diameter of, for example, 0.1 mm, #100, and are arranged at a suitable position so that they come in contact with the waterproof films 17, 18 when the latter are deformed due to the fixed water pressure.

Operation of the waterproof microphone 10 will be explained hereinafter.

As shown in FIG. 2A, in the waterproof microphone 10, when in normal use, the waterproof films 17, 18 are in the state parallel with the stainless steel meshes 21, 22.

At this time, since the stainless steel meshes 21, 22 operate as a diaphragm having a low acoustic impedance, they affect various properties of the waterproof microphone 10 less.

On the other hand, for example, a user drops waterproof microphone 10 into water, the waterproof films 17, 18 are deformed, as shown in FIG. 2B and come in close contact with the stainless steel meshes 21, 22.

Accordingly, even if water pressure acting on the waterproof films 17, 18 increases, the waterproof films 17, 18 are controlled in their deformation by the stainless steel meshes 21, 22 and are not likely broken.

When the waterproof films 17, 18 come in close contact with the stainless steel meshes 21, 22, the waterproof films 17, 18 are formed into a number of diaphragms divided into a small area, the waterproof microphone 10 can absorb sound in water, also.

As described above, according to the waterproof microphone 10 of the present embodiment, since the deformation of the waterproof films 17, 18 is controlled uniformly by the control means 20, even if the thickness, shape and the like of the waterproof films 17, 18 are suitably set, there is less possibility that rupture or the like caused by water pressure occurs.

Accordingly, according to the waterproof microphone 10 in the present embodiment, various properties such as the sensitivity, frequency responsiveness or the like can be enhanced as compared with the conventional waterproof microphone.

Further, since the control means 20 comprises the meshes 21, 22, in normal use of the waterproof microphone 10, the meshes 21, 22 operate as a diaphragm having a low acoustic impedance not to impede various properties.

The meshes 21, 22 are formed into a number of small diaphragms due to the close contact of the waterproof films 17, 18 in water, and the waterproof microphone 10 can absorb sound in water.

It is to be noted that the present invention is not limited to the aforementioned embodiment but improvements, modifications and the like within the scope of accomplishment of the present invention are included in the present invention.

For example, the meshes illustrated as the control means may be metal other than stainless steel or may have adequate elasticity such as synthetic resins. If the meshes have the elasticity, the sound quality when absorbing sound in water can be improved.

Further, the control means is not limited to the meshes but there can be employed the construction in which for example, a suitable rod-like member is arranged parallel with the waterproof film to thereby control the deformation of the waterproof film.

For others, the material, shape, dimension, form, number, arranging places or the like of the waterproof film, control means, meshes and the like shown in the aforementioned embodiment are suitable and not limited as long as they can accomplish the present invention.

We claim:

1. A waterproof microphone including

a case;

an acoustic terminal unit having a front acoustic terminal and a rear acoustic terminal held within said case by a unit holder and a unit case;

waterproof films in said case for covering the front and rear acoustic terminals of the acoustic terminal unit, said waterproof films being deformable at a predetermined water pressure; and

a restraining means provided between each of said front acoustic terminal, said rear acoustic terminal and said waterproof films for restraining the deformation of said waterproof films.

2. A waterproof microphone according to claim 1, wherein said restraining mean operate as a diaphragm with lower acoustic impedance.

3. A waterproof microphone according to claim 1, wherein said restraining means operate as a plurality of small diaphragms, when said waterproof films come into contact with the restraining means at said predetermined water pressure.

4. A waterproof microphone according to claim 1, wherein said restraining mean comprise meshes arranged parallel with each of said waterproof films.

5. A waterproof microphone according to claim 2, wherein said restraining mean comprise meshes arranged parallel with each of said waterproof films.

6. A waterproof microphone according to claim 3, wherein said restraining mean comprise meshes arranged parallel with each of said waterproof films.

7. A waterproof microphone according to claim 1, wherein said restraining means comprise pole members arranged parallel with each of said waterproof films.

8. A waterproof microphone according to claim 2, wherein said restraining means comprise pole members arranged parallel with each of said waterproof films.

9. A waterproof microphone according to claim 3, wherein said restraining means comprise pole members arranged parallel with each of said waterproof films.

10. A waterproof microphone according to claim 1, wherein said waterproof films are formed in a predetermined shape by polyethylene terephthalate.

11. A waterproof microphone according to claim 2, wherein said waterproof films are formed in a predetermined shape by polyethylene terephthalate.

12. A waterproof microphone according to claim 3, wherein said waterproof films are formed in a predetermined shape by polyethylene terephthalate.

* * * * *

US005457751A

# United States Patent [19]

Such

[11] Patent Number: 5,457,751

[45] Date of Patent: Oct. 10, 1995

[54] **ERGONOMIC HEADSET**

[76] Inventor: Ronald W. Such, P.O. Box 1041, Portsmouth, N.H. 03802-1041

[21] Appl. No.: 79,131

[22] Filed: Jun. 18, 1993

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 821,181, Jan. 15, 1992, abandoned.

[51] Int. Cl.[6] ..... H04R 25/00

[52] U.S. Cl. ..... 381/183; 381/187; 348/115

[58] Field of Search ..... 381/183, 187, 381/68.6, 68.7, 205, 188, 68.5. 183, 187; 379/430; 455/89, 90, 351; 358/103, 104, 109

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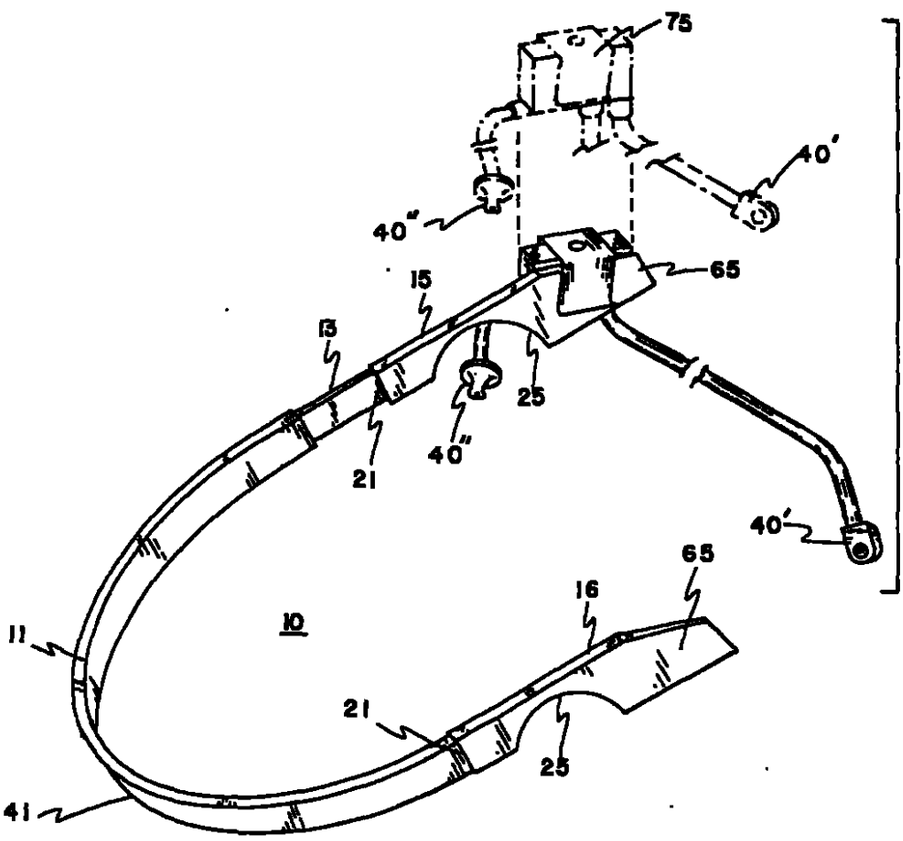
*Primary Examiner*—Curtis Kuntz
*Assistant Examiner*—Huyen D. Le
*Attorney, Agent, or Firm*—William B. Ritchie

[57] **ABSTRACT**

Headset framework apparatus designed to be worn around the back of the head, and supported, in part, by the ears of the user, and, in part, by the nape, or back of, the user's neck. The framework and support means of the apparatus, is preferably, substantially U-shaped, and may be further shaped, such that it generally conforms to the user's neck and head. At least one integral, or detachable, speaker means is provided, which extends from the framework and support means, proximate to the ear of the user. A microphone may also be provided, if desired. Visual display means attached to the framework are also provided. Also, electronic component means, may be integral with, or removably attachable to, the nape supported member of the framework and support means, or may be located at other than the site of the headset framework apparatus, and operatively connected thereto.

**18 Claims, 7 Drawing Sheets**



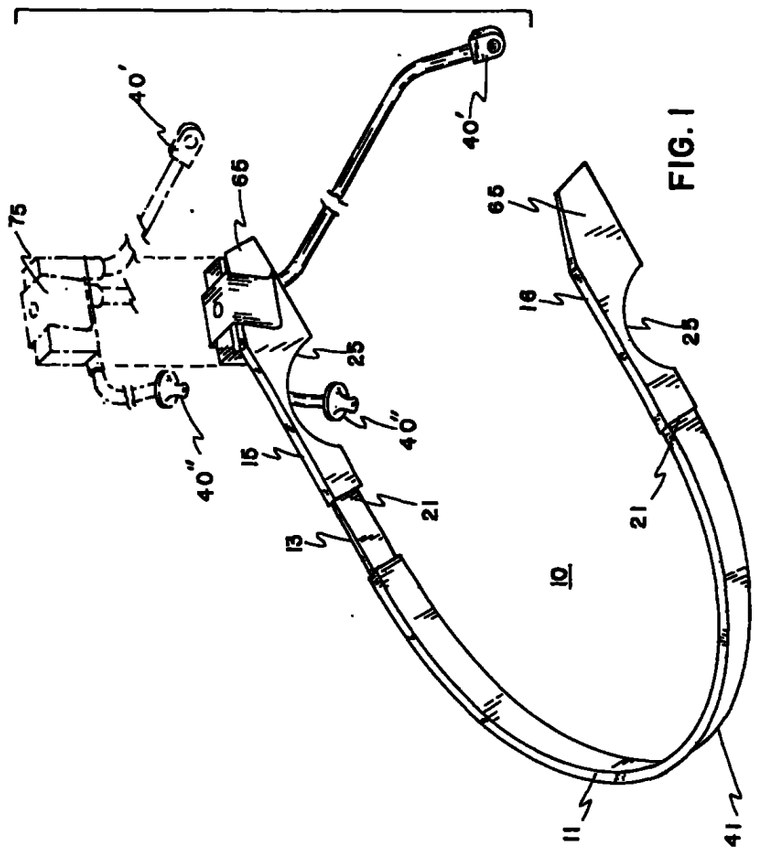



FIG. 1

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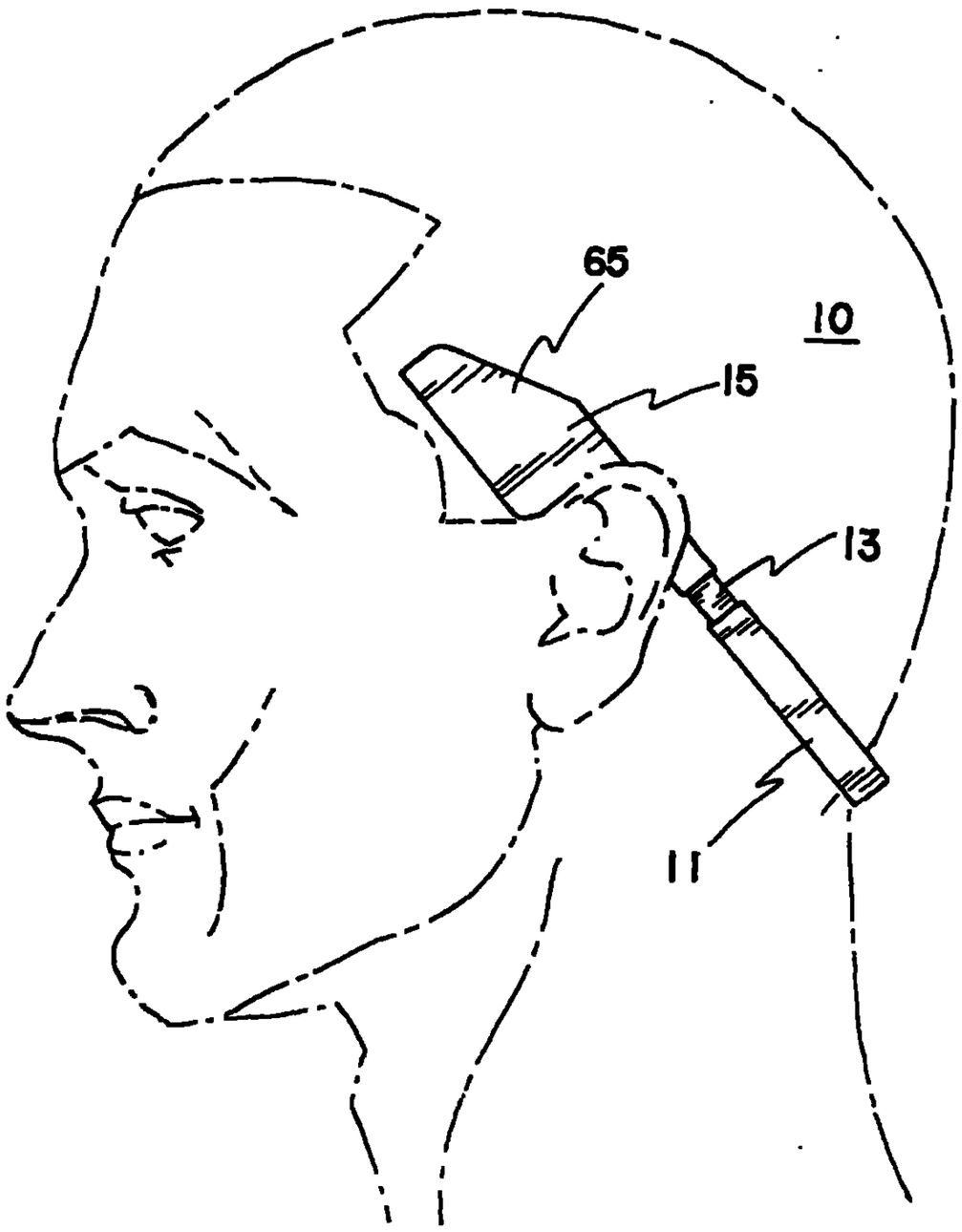


FIG. 2

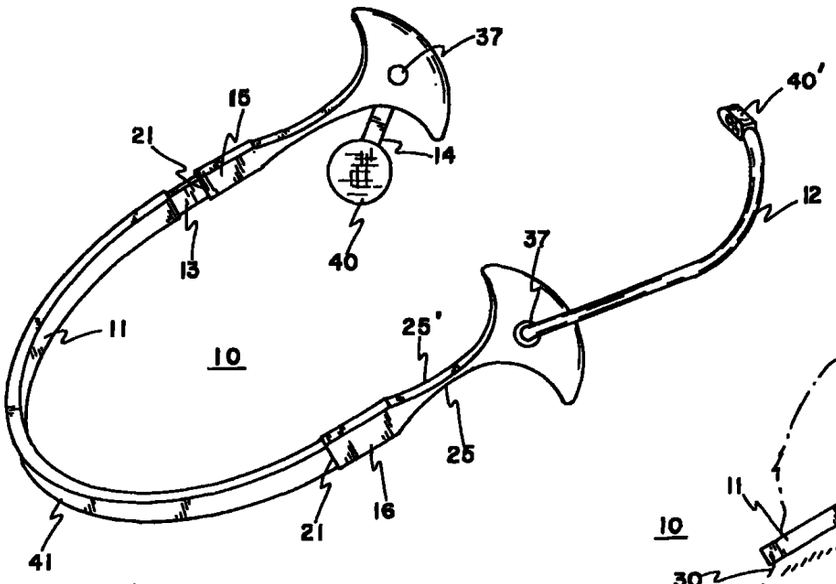


FIG. 3

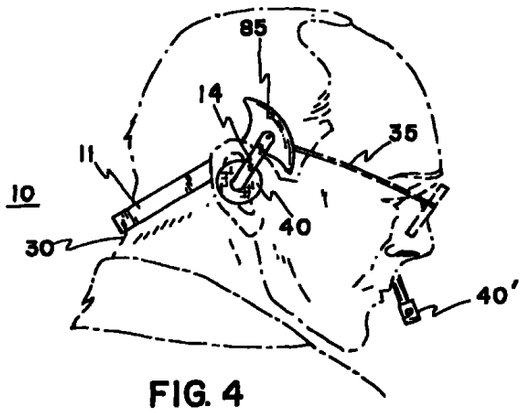


FIG. 4

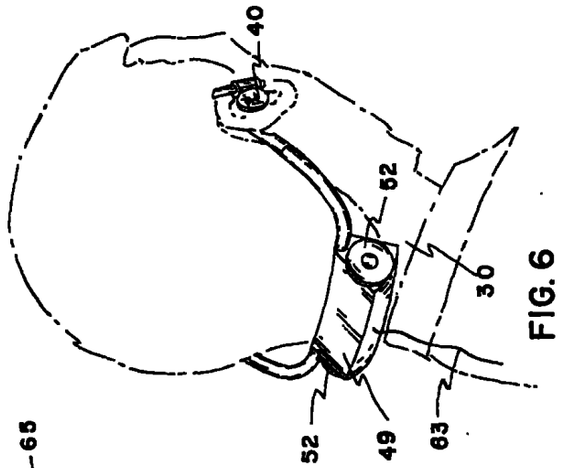


FIG. 6

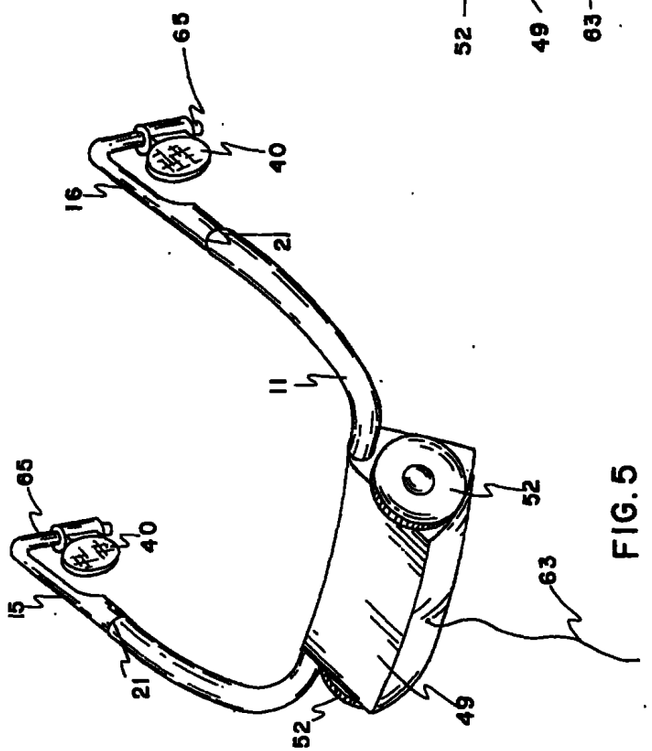


FIG. 5

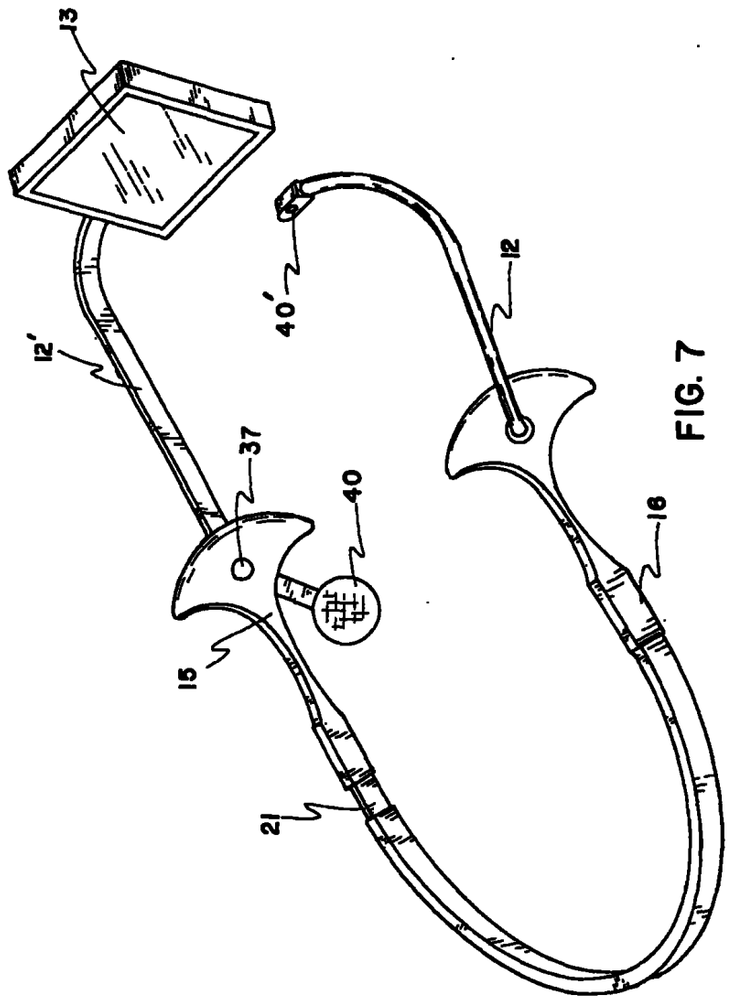


FIG. 7

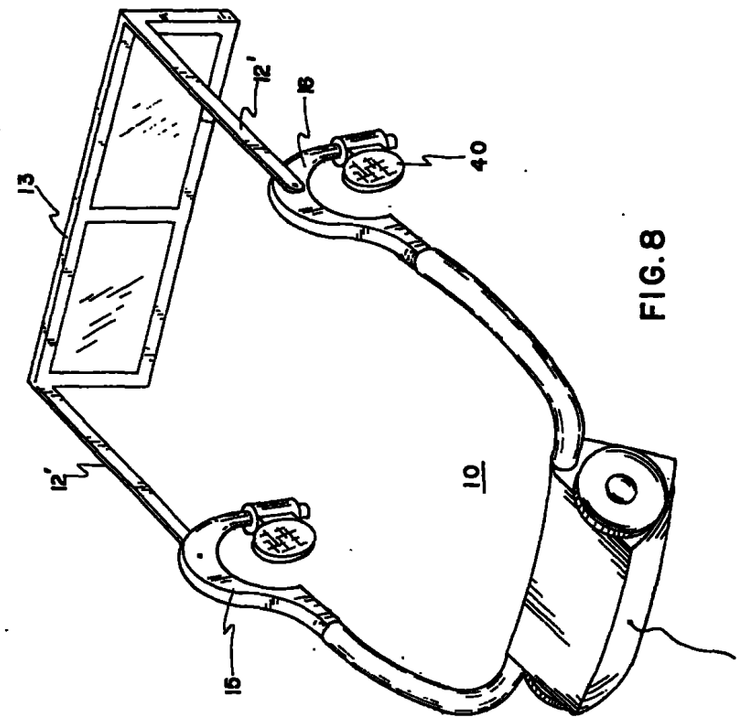


FIG.8

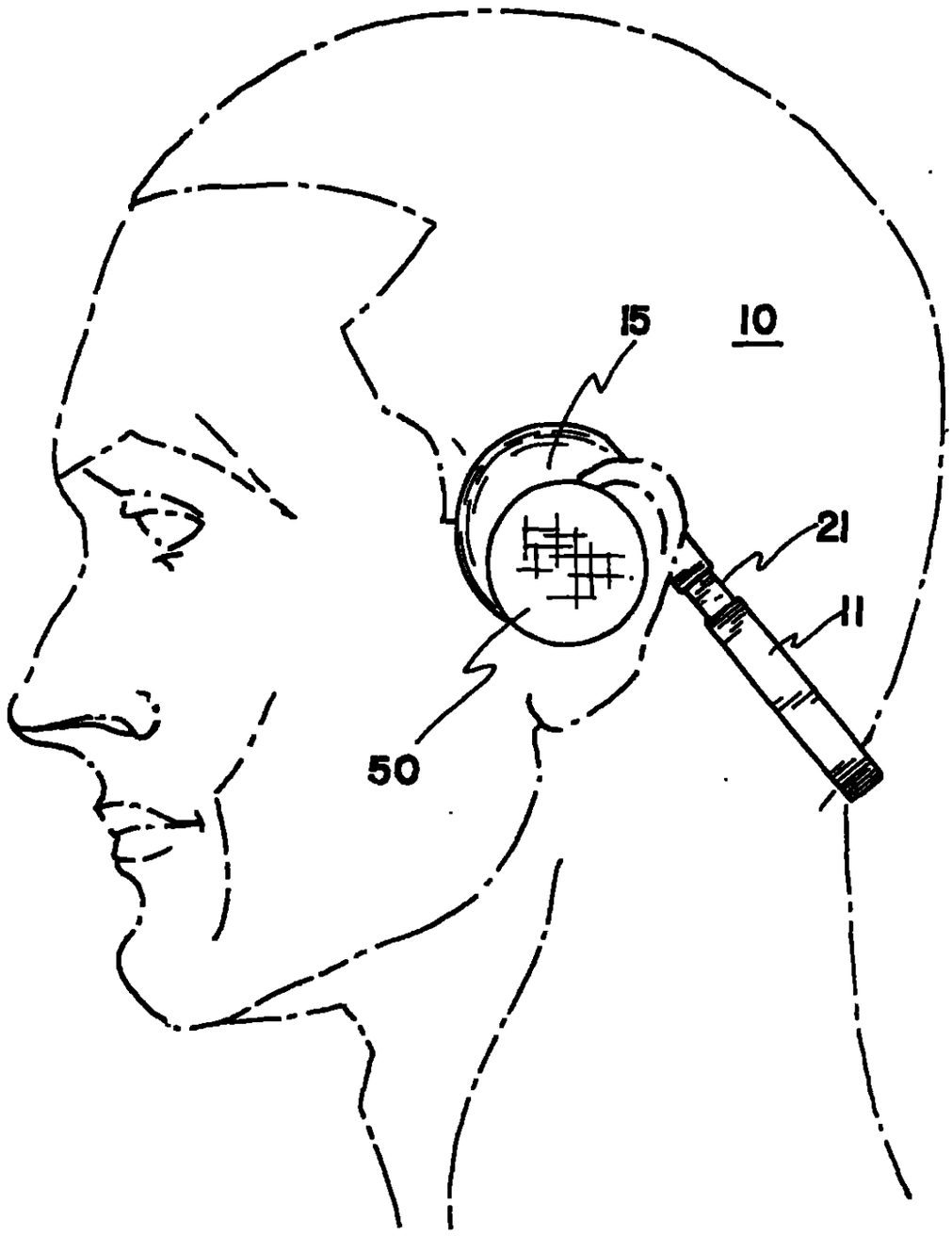


FIG. 9

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# ERGONOMIC HEADSET

This is a continuation-in-part of the U.S. application Ser. No. 07/821,181 filed Jan. 15, 1992, now abandoned.

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to headsets in which the framework and support means are rear-mounted on the back of the user's neck.

2. Description of the Related Art

It is a major problem in the field of headsets, to devise an apparatus which does not, over time, create pressure upon the ears of the user, thereby causing significant discomfort. Heretofore, in the conventional clamping types of headset apparatus, the speakers themselves attach, or press on the ears, connected by a tensioned band that rests over the top of the head of the user. Speaker contact with the ears is an essential factor of support for this type of conventional apparatus. The clamping pressure on the ears, which holds the headset in place, is not only uncomfortable and tiring, but the apparatus is not held securely, upon movement of the head. When the user bends down, looks up, or moves about, somewhat energetically, this conventional type of headset apparatus tends to dislodge. The inherent instability in this type of device is due to a substantial portion of the head set frame being located distant from the center of rotation of the head and the use of the ears as a primary support for the frame. Generally, the over-the-head measurement from ear to ear is 1.4 to 1.6 times the back-of-the-head distance. Further, a headset framework that coincides with the smaller back-of-the-head measurement will have a moment of inertia centered closer to the point in the human body that confers the greatest range of combined three axis movement, that is, nodding the head backward and forward, tilting left and right, and rotation left and right. This point is coincident with the axis vertebra in the cervical region of the neck.

The head band of conventional headsets rests on the top of the head. This position maximizes inertial forces on the headband due to head movement and is inherently unstable.

Another type of conventional headset apparatus is one utilizing plug-type earphones, connected by a U-frame which hangs under the chin. These headsets are supported at the ear canal by tension in the U-frame, which pushes the earpieces into the ear canal. The ear canals must support the weight of the U-frame, as in a stethoscope. They are very irritating to the ear canals, when the U-frame is bumped by the user, or when the audio cable, connected to the U-frame, is tugged. Movement of the user's head forward or backward, or movement of the head, left or right, causes the earpieces to rotate in the ear canal in the first case, or produces differential pressure on the ear canal, when the U-frame touches the shoulder, in the second case. Both effects are caused by the rigidity of the hanging U-frame, which transmits these pressures to the ear canal.

The under-chin, plug-type, headset apparatus, is also objectionable, because its rigid U-framework configuration and wiring in the front, oftentimes gets in the way of the user. It is important for pilots, or headset apparatus users, such as users of WALKMAN-type systems, to have a comfortable configuration, which enables extended headset wear, as well as stability of attachment, and freedom of movement in the front of the user. Additionally, the prior art designs of headset apparatus, are highly incompatible with the simultaneous use of other headgear, such as hats, helmets, oxygen masks, and the like.

U.S. Pat. Nos. 2,566,313 and 2,611,831, issued to Cates, disclose a behind the head type of headset which is supported by the two ears. While Cates discloses a headset that moves the headset to a position closer to the center of rotation of the user's head, it still uses only a two-point support method and is limited to acoustic tube sound delivery.

United Kingdom Patent No. 602,379 discloses another headset that features earpieces having ear-hooks. An alternative embodiment shows the ear-hooks connected by a neck band. However, as in the Cates disclosure, the device is still supported only by the user's ears.

U.S. Pat. No. 1,581,882 discloses a headset apparatus which hangs under the chin yet does not rely on the plug-type earphones. This apparatus supports the earpiece at the ears with a loop adapted to fit over the ears. However, this design also has the wiring running in front of the user. This creates a loss of freedom of movement in the front of the user, and does not provide for a stable headset.

Design U.S. Pat. No. 229,312 is another example of a headset which loops around the ears. Although not specifically indicated in the patent, the shape of the framework requires that it hang under the user's chin. The '312 headset design supports the frame on only the user's ears, thereby, not providing the stability needed to prevent the headset from dislodging when the head is moved.

Another design, the Q15, manufactured by AKG Audio Communication, discloses a headset design that features ear supports that loop forward and below the ears and then join around the back of the user's head. Again, this device relies solely on the user's ears as the support for holding the device to the head.

Also, another recurring problem is that electronic components are not ergonomically integrated with, or attachable to, conventional headset frameworks. Incorporating the extra weight and bulk of these electronic components increases pressure upon the ears, magnifies undesirable inertial effects, and further decreases the security of adherence to the head.

Nothing in the prior art provides for an ergonomically designed headset framework that enables the user to wear the headset for long periods of time comfortably while providing a secure fit that will prevent the headset from dislodging under the range of motions possible during use.

## SUMMARY OF THE INVENTION

It is an object of the invention to provide a headset framework that is comfortable for the user to wear over extended periods of time.

It is another object of the invention to provide a headset framework that is highly stable, and does not come loose upon head movements by the user, and is highly compatible with the simultaneous use of other headgear.

It is still another object of the invention to provide a headset framework that can carry all types of audio and visual devices, either alone or in combination with one another.

It is still another object of the invention to provide a headset framework that can ergonomically carry all types of audio and visual electronic components.

It is a further object of the invention to provide a headset framework that provides a three point support method, utilizing the ears and the nape of the neck.

The invention is an ergonomic headset for carrying audio and visual devices on a user's head. A left ear supported member, having anterior and posterior ends, is provided. The left ear supported member has a first left surface shaped to conform to the cleft between the left auricle and the temporal bone region of the user's head. The surface extends anterio-inferiorly around the helix of the user's ear, at the forward end of the cleft. The device also has a right ear supported member, having anterior and posterior ends. The right ear supported member has a first right surface shaped to conform to the cleft between the right auricle and the temporal bone region of the user's head. The surface extends anterio-inferiorly around the helix of the user's ear, at the forward end of the cleft.

A nape supported member, having left and right ends continuous with the corresponding posterior ends of the left and right ear supported members, is provided. The nape supported member has a nape surface shaped to conform to the user's neck region dorsal to the axis vertebra of the user. Resiliency means is provided in the nape supported member for urging the left and right ear supported members snugly against the corresponding left and right temporal regions of the user.

Adjustment means operative between at least one ear supported member and the nape supported member is provided. Adjustments means adjusts the headset framework length between the ears and the nape of the neck, so that the headset framework will fit snugly on the user's head, supported by the auricle clefts and the nape of the user's neck. Device connecting means for carrying the audio visual device is provided. Device connecting means is secured to at least one of the left and right ear supported members.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of the headset framework with a pilot's earpiece and microphone attached via clip on mechanism in accordance with the invention.

FIG. 2 is an isometric view of the headset framework of FIG. 1 being worn by an individual with the audio devices removed.

FIG. 3 is an isometric view of an alternative embodiment of the headset framework, adapted for situations requiring an "ambi-sided" headset.

FIG. 4 is an isometric view of the headset framework shown in FIG. 3 as fitted to the individual with the audio devices.

FIG. 5 is an isometric view of the headset framework with an integral electronic component.

FIG. 6 is an isometric view of the headset of FIG. 5 as fitted to the individual.

FIG. 7 is an isometric view of the headset framework of FIG. 3 with a visual device attached.

FIG. 8 is an isometric view of the headset framework with an integral electronic component, speakers and a viewing screen.

FIG. 9 is an isometric view of the headset framework adapted to carry stereo headphones.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention provides an integral framework and support means, not requiring pressure on the ears, for a headset framework apparatus, which is self-supporting, even when no audio visual devices are attached (See FIG. 2). Thus, when earphones, speakers, microphones, visual displays or other devices are attached, or even when they are integrated within the framework, such devices do not exert any pressure on the user in order to maintain the position of the headset framework on the user. The following discussion will illustrate representative uses of the novel headset framework with a few of the large number of possible permutations and combinations of electronic and optical devices and components. The term "device" as used herein means any user/headset interface structure capable of receiving voice or other human input such as pupil position and/or capable of supplying output to the ears and eyes. For example, a microphone, an earphone, earpiece, a mirror, a lens, a liquid crystal display, etc. The term "component" as used herein means any structure capable of processing the input/output of a device as defined above and not necessarily interfacing directly with the user. For example, a radio, a vcr, a television, a stereo, a computer, etc.

The numbers of devices and components that are designed to be worn on the user's head is increasing almost daily. From the humble beginnings of simple earphones and microphones, the list of electronic and optical(hereinafter "electrooptical") apparatus designed to be worn on the head of the user now includes binoculars, am-fm receivers and transmitters, tape players and recorders, televisions with virtual vision capabilities, cordless infrared receivers, camcorders, hi-intensity medical lights, microscopes for delicate surgery, miniature stereo speakers, liquid crystal monitors, computer interfaces, laser weapon sights and so on. Other electro-optical apparatus, such as VIRTUAL VISION, a television or video player that has a see-through virtual image screen worn in front of the viewer's eyes, is designed to have the visual device worn on the head with the necessary electronic components on the belt. As miniaturization in electronics continues to progress, additional devices and components, such as eye-controlled computers to effect a variety of tasks from surgery to word processing will be commonplace. The invention disclosed, herein, is capable of supporting any such structure that is to be worn on the head of the user.

FIG. 1 is an isometric view of the headset framework with a pilot's earpiece 40" and microphone 40' set attached via clip 75 on ear supported member 15. This type of set is used by every major airline in the U.S. The earpiece can be either custom fit or different sized earpieces of silicone rubber can be used to achieve comfort. Note that the audio devices are not a part of the support structure of framework 10.

The framework features a unique three-point support utilizing the user's ears and nape of the neck. As noted above, the back-of-the-head measurement from ear to ear is only about two thirds of the over-the-head measurement. Also, by centering at the nape of the neck, it then becomes possible to concentrate as much mass of the headset framework and attached electro-optical components as close as possible to the quiescent point, the axis vertebra.

Nape member 11 features a surface 41 that is shaped and dimensioned to correspond to the region dorsal to the axis vertebra of the user's neck. Nape supported member 11 is preferably composed of a resilient material.

The remaining two points of support are provided by left ear supported member 15 and by right ear supported member 16. Surfaces 25 extend anterior-inferiorly around the helix of the user's ear, at the forward end of the cleft between the auricle and the temporal bone region of the user's head.

Since members 15, 16 can be moved independently from one another as shown, framework 10 can be adjusted accu-

rately to accommodate ear-to-nape-of-neck distance of the wearer, even when such length varies from ear to ear.

In this manner, framework 10 is extremely stable when in position even when subjected to head movements that would cause an ordinary headset to be dislodged.

The left and right ear supported members 15, 16 extend from the nape supported member 11, generally parallel, or at a slight angle, from the termini of member 11, in order to support framework 10, on both user's ears from behind.

Adjustably connecting ear supported members 15, 16 to member 11 are a pair of resilient bands 13 (partially shown between member 15 and 11 only), which urges members 15, 16 gently against the temporal region of the user's head to further provide positional stability.

Also, bands 13 provide adjustability to account for differences in the measurement from one ear to the nape of the neck versus the distance from the other ear to the nape of the neck. The preferred embodiment shows internal "spring-like" bands 13 housed within members 11, 15, 16. However, an alternative embodiment would be to replace bands 13 with resilient tubes fitted to the exterior of members 11, 15, 16. This alternative would also be acceptable as long as the desired resiliency and adjustability requirements were met. Another alternative is to make members 11, 15 and 16 themselves resilient and to have either members 15, 16 slide over member 11 to provide adjustment or to have member 11 slide over members 15, 16.

The posterior ends 21 of members 15, 16 preferably correspond in size and shape with member 11 as shown. However, use of framework 10 to support different audio visual devices may require configurations where member 11 is greater than or smaller than members 15, 16 in the region of ends 21.

In this variation, the anterior ends 65 of ear supported members 15 and 16 are adapted to accommodate clip mechanism 75 which releasably attaches the audio devices to framework 10. Since both of ear supported members 15 and 16 are so adapted, it is possible for the user's to place the audio devices on either side of the head, thereby permitting the free ear to be nearest an adjacent crew member.

FIG. 2 is an isometric view of the headset framework of FIG. 1 being worn by an individual with the devices removed. As discussed above, the audio devices are not necessary for the headset framework to be held secure on the user.

FIG. 3 is an isometric view of an alternative embodiment of the headset framework, adapted for situations requiring an "ambi-sided" headset. The term "ambi-sided" means that the headset framework can be worn such that the earphone and/or microphone can be on either side of the head. This embodiment is particularly useful for aircraft crew members since the pilot and co-pilot must be able to talk to one another without an earphone blocking the ear closest to the co-crew member. However, any situation where a "free" ear is required, but not always the same ear, could utilize this embodiment. Note that the microphone 40' and earphone 40 are shown on opposite ear supported members. However, microphone 40' and earphone 40 could just as easily be both located on the same ear supported member with the other ear supported member supporting another device, such as a rear view mirror or computer interface display.

Surfaces 25' are in the same plane and 180 degrees opposite to surfaces 25, as a vertical mirror image of the opposing surface. Thus, this embodiment allows interchangeable use of the headset for left and right ear phone and microphone placement.

On each ear supported member 15, 16 is a pivot attachment 37. Pivot attachment 37 attaches earphone 40 to member 15 and microphone 40' to member 16, respectively. As previously mentioned, devices do not have to be touching the user's ear or ear canals in order to support framework 10 on the user's head, thus providing a great improvement in comfort. Since earphone 40 and microphone 40' do not participate in positioning framework 10 on the user's head, they can be easily adjusted to a position that is most comfortable for the wearer. In this case, earphone 40 is comfortably worn close to the user's ear with little pressure from framework 10 being exerted thereon. Also, since framework 10 is extremely stable when worn, normal head movements will not translate force from framework 10 to earphone 40.

The framework 10 and its microphone 40' and earphone 40 are ambi-sided and worn with either the earphone 40 on the left and microphone 40' on the right or vice versa. Microphone 40' and earphone 40 are preferably centrally located on members 15 and 16 and rotatable. Therefore, framework 10 can easily be adjusted to have earphone 40 cover the left ear with microphone 40' extending from that part of framework 10 supported by the right ear or vice versa.

Microphone 40' is connected to framework 10 via a boom 12 attached to pivot attachment 37. This allows for microphone 40' to be placed an appropriate distance from the user's mouth. Earphone 40 is connected to framework 10 via connecting extension 14 which enables earphone 40 to be positioned over the ear canal to facilitate maximum sound transmission.

Although audio devices are shown attached to framework 10 in this variation, other devices could be easily substituted. For example, if a mirror was attached to the end of boom 12, this variation would serve as a combination rear view mirror and audio listening device.

For example, if framework 10 was used for a bone conduction type of hearing aid, one or perhaps both of members 15, 16 would be enlarged and shaped in the region of ends 21 to house the electronics and sound vibration transducer mechanism that would contact the user's mastoid bone to provide simulated sound through bone conduction to the inner ear.

On the other hand, if an electronic component is integral with framework 10 such as that shown in FIG. 5, member 11 will be dimensioned accordingly. While the respective sizes and shapes of members 11, 15, 16 will be altered to accommodate the various electronic components or electro-optical devices attached to and incorporated therein or thereon, the basic structure of the framework remains the same. Left and right ear supported members adjustably and resiliently connected to a nape supported member with one or more device/component connection structures incorporated or attached to one or more of the supported members is the essence of the invention. Thus, the invention is extremely flexible and is able to accommodate virtually any type of audio or visual device or component that is to be worn by a user.

FIG. 4 also shows that framework 10 can be used even when the user is wearing eyeglasses 35. Framework 10 is supported by the user's neck by nape supported member 11, right ear supported member 16 and left ear supported member 15 (not shown). Also, any added wiring, or cable (not shown), is preferably attached to the back of the nape supported member 11 and internally connected through framework 10 to relevant components and devices, where it

does not interfere with the front of the user. The present invention is, therefore, highly compatible with the simultaneous use of any audio visual device or electronic component that is to be placed on or associated with a headset. Like the earlier embodiment, this framework is also generally of a U-shaped configuration supported by the nape of the neck and both ears of the user when worn. The nape supported member 11 has a surface 41 conformal with the neck region and dorsal to the axis cervical vertebra of the user. An ear cleft engaging segment 85 is found at each of the two general extremities of the framework. The ear cleft engaging segment 85 covers the ear region and extends forward beyond the ear. This inhibits rearward displacement of the framework on the user's head. The user input/output means, in this case, earphone 40 is located on at least one ear cleft engaging segment 85.

FIG. 5 is an isometric view of the headset with an integral electronic component 49 as part of nape supported member 11. This variation would be ideal for a radio receiver or transmitter, well known in the art, or as miniaturization improves, other units such as tape players and recorders, computer processing and memory storage units, CD's, etc. The electronic component utilizes control knobs 52 oriented in the sagittal plane relative to said user. For use as a radio, one control knob adjusts the power and volume and the second tunes the frequency. A flexible antenna 63 extends distally from component 49.

With most conventional headset frameworks adapted to support a radio or other devices, the increased weight decreases the stability of the headset in that additional weight on the head-spanning band provides a greater moment about the axis of rotation, tending to induce dislodging of the headset when the head is moved. However, with the invention, stability is actually increased, since the increased weight of device 49 is very close to the axis vertebra of the wearer, resting at the stable axis point at the back of the user's neck.

Earphones 40 are designed to be swiveled about the adapted anterior ends 65 of ear supported members 15, 16. This adaptation of ear supported members 15, 16 shows how easily the headset framework 10 can be modified to accommodate a wide range of devices. Thus, earphones 40 can be positioned close to the user's ears, but without necessarily touching, which might cause discomfort.

FIG. 6 is an isometric view of the headset of FIG. 5 as fitted to the individual. The added weight of electronic component 49, at the axis point, or the back of the neck 30, can provide additional overall stability to the headset. Further, the "wedge" shape of device 49 is designed to conform to the nape of the user's neck so that the head may be tipped backwards without interference from device 49. The left and right ear supported members 15, 16 rest on the ears as comfortably as would eye glasses.

FIG. 7 is an isometric view of the headset framework of FIG. 3 with visual device 13 attached via a second boom 12'. Device 13 could be a simple mirror where the user of headset framework needs to watch events taking place behind him/her. Also, device 13 could be a screen so that the operator can still see what is in front of him/her yet monitor other events as well. This would be ideal for an air traffic controller who needs to watch for planes from the tower, monitor a wearable headset radar screen and maintain communications with aircraft simultaneously. As mentioned above, this embodiment of framework 10 is ambi-sided. Also, device 13, earphone 40 and microphone 40' could be all on the same side or split as shown. Since device 13 is attached to framework 10 via pivot attachment 37, then it is possible to move device 13 up over the user's head if an unobstructed view is required.

FIG. 8 is an isometric view of the headset framework with an integral electronic component, speakers and a viewing screen. This variation shows how conveniently the invention can be adapted to carry the latest electronic wizardry such as VIRTUAL VISION personal projection television that is worn on the head. The VIRTUAL VISION apparatus uses an active matrix color display in combination with a transparent reflective surface and lens to project a virtual image that appears about ten feet in front of the user. In this variation, component 49 could house some or all of the electronics for the television/vcr apparatus. Earphones 40 would provide stereophone sound while the user watches screen 13. Screen 13 is attached to framework 10 via booms 12'. As in FIG. 7, screen 13 can be easily rotated above the user's head if the user needs to have an unobstructed view of his/her surroundings. Screen 13 is shown divided so that two different stereoscopic pictures could be viewed simultaneously. Also, this variation could be set up as a "VIRTUAL VISION" apparatus with the video display being attached to either member 15 or 16, depending on the user's dominant eye, and screen 13 would then be a reflective screen.

FIG. 9 is an isometric view of the headset framework adapted to carry stereo headphones. Ear supported members 15 and 16 (not shown) are adapted to carry high fidelity speakers 50 which can be placed adjacent to the ears. The molding holding the speakers is integral with the molding forming the ear supported members 15 and 16. As in the previous examples, speakers 50 do not carry the weight of the framework 10 so that pressure on the user's ears is minimal. Framework 10 is adjusted via bands 21 so that nape supported member 11 is snugly fitted to the user's neck. Wiring (not shown) for the framework would preferably be internal and would exit from the rear, thus keeping any wires out of the user's way. In this position, the user is free to actively move about, exercising, running or jogging, skiing, etc. yet the stereo headphones will remain securely and comfortably in place.

While there have been described what are at present considered to be the preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and it is, therefore, aimed to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. An ergonomic headset framework for carrying an electro-optical device on a user's head comprising:

left ear supported member, having anterior and posterior ends, and having a first surface shaped to conform to the cleft between the left auricle and the temporal bone region of the user's head and said surface extending anterior-inferiorly around the helix of the user's ear, at the forward end of said cleft;

right ear supported member, having anterior and posterior ends, and having a first surface shaped to conform to the cleft between the right auricle and the temporal bone region of the user's head and said surface extending anterior-inferiorly around the helix of the user's ear, at the forward end of said cleft;

nape supported member, having left and right ends continuous with the corresponding posterior ends of the left and right ear supported members, and having a surface shaped to conform to the user's neck region

dorsal to the axis vertebra of the user;

resilient means in the nape supported member for urging said left and right ear supported members snugly against the corresponding left and right temporal regions of the user;

adjustment means operative between at least one ear supported member and the nape supported member, for adjusting the headset framework length between the ears and the nape of the neck, so that said headset framework will fit snugly on the user's head, supported by the auricle clefts and the nape of the user's neck; and

device connecting means for carrying the electro-optical device, said device connecting means secured to at least one of said left and right ear supported members.

2. The headset framework of claim 1, wherein said device connecting means further comprises a boom disposed between one of said ear supported members and said electro-optical device.

3. The headset framework of claim 1, wherein said device connecting means further comprises pivot means, disposed between one of said ear supported members and said electro-optical device, for rotating said electro-optical device about an axis.

4. The headset framework of claim 1, wherein said electro-optical device is selected from the group consisting of a microphone, earphone, speaker, hearing aid, a mirror, liquid crystal screen, a lens, a light, a laser.

5. The headset framework of claim 1 further comprising a signal carrying cable attached to said framework.

6. The headset framework of claim 1 further comprising:

a second surface on said left ear supported member, wherein said second surface is substantially identical to and in the same plane of said first surface and oriented 180 degrees opposite thereto, as a vertical mirror image of said first surface, and;

a second surface on said right ear supported member, wherein said second surface is substantially identical to and in the same plane of said first surface and oriented 180 degrees opposite thereto, as a vertical mirror image of said first surface; wherein said headset framework can be worn interchangeably by the user with the right ear supported member supported by the left ear of the user and the left ear supported member supported by the right ear of the user.

7. The headset framework of claim 6 further comprising a microphone device carried on one ear supported member and an earphone carried on the other ear supported member, wherein said headset framework can be worn by the user either with the earphone on the right ear and the microphone extending from the left ear or with the earphone on the left ear and the microphone extending from the right ear.

8. The headset framework of claim 6, wherein said electro-optical device is selected from the group consisting of a microphone, earphone, speaker, hearing aid, a mirror, liquid crystal screen, a lens, a light, a laser.

9. The headset framework of claim 1, wherein said device connecting means further comprises an attachment surface adjacent to the anterior end of at least one of said ear supported members, dimensioned to correspond in size to a clip on a pilot's removable attachable communication boom-set comprising a flexible, adjustable boom microphone and an earpiece.

10. The headset framework of claim 1, wherein said nape supported member further comprises an electro-optical component.

11. The headset framework of claim 10, wherein said electro-optical component further comprises a first control knob oriented in a first sagittal plane relative to said user and a second control knob oriented in a second sagittal plane relative to said user.

12. The headset framework of claim 11, wherein said electro-optical component further comprises a flexible antenna extending distally from said component, such that said antenna is substantially vertical when said user is in a standing position.

13. The headset framework of claim 10, wherein said electro-optical component is selected from the group consisting of a digital processor, audio amplifier, audio cassette player, audio cassette recorder, radio receiver, radio transmitter, video amplifier, television receiver.

14. The headset framework of claim 11, wherein said electro-optical component is a radio in which the first said control knob adjusts the power and volume of said radio and the second said control knob tunes the frequency of said radio.

15. An ergonomic framework of a generally u-shaped configuration supported by the nape of the neck and both ears of the user when worn, and useful for selective incorporation of an electronic component and selective attachment of an audio input output device comprising:

ear cleft engaging segments at both ends of said framework, each of said ear cleft engaging segments having a first surface conformal with the cleft between the ear and its respective temporal bone region, each of said ear cleft engaging segments being forward of each ear and downward, to inhibit rearward displacement of said framework on the user's head;

a nape supported segment at the rear of the framework as worn, intermediate between and continuous with the rear of said ear cleft engaging segments of said framework, and the nape supported segment having a surface conformal with the neck region, dorsal to the axis cervical vertebra of the user;

resilient means in said nape supported segment for urging said ear cleft engaging segments snugly against the respective temporal bone regions of the user;

adjustment means operative on said nape supported segment for adjusting the length of said framework between the nape and the ears for optimum fit to the user's head;

said audio input output device selected from the group of audio visual communication devices consisting of a microphone, earphone, speaker, liquid crystal display, and reflective visual display; and

device connecting means secured to at least one of said ear cleft engaging segments to bear the audio input output device.

16. The framework of claim 15, wherein the electronic component comprises audio visual information processing means integral with said nape supported segment, the audio visual information processing means being selected from the group consisting of a digital processor, audio amplifier, audio cassette player, audio cassette recorder, radio receiver, radio transmiter, video amplifier, television receiver.

17. The framework of claim 15 further comprising:

a second surface on both said ear cleft engaging segments, wherein the second surfaces are substantially identical to and in the same plane, as a vertical mirror image of said first surfaces, whereby said framework can be worn interchangeably by the user with the right ear engaging segment supported by the left ear of the user and the left ear engaging segment supported by the

right ear of the user.

18. The framework of claim 15, wherein said device connecting means further comprises an attachment surface adjacent to the forward end of at least one of said ear cleft engaging segments, dimensioned to correspond in size to a clip on a pilot's removably attachable communication boomset comprising a flexible, adjustable boom microphone and an earpiece.

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## (54) An electronic device for a mobile radio station

(57) An electronic device (1) that is connectable to a mobile radio station, such as a mobile telephone (14), comprising a housing (2) that is mechanically as well as electrically connectable to the mobile radio station in a releasable manner. The device is provided with electronic communication components. It comprises a neck-strap (6) to be worn around the neck of a user (15) of the mobile radio station and connecting means adapted for firm connection between the device and the mobile radio station.

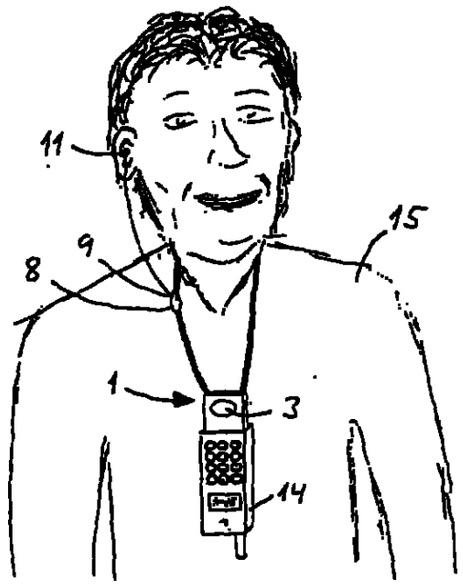


Fig.2

EP 1 223 682 A1

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## Description

### Technical field

[0001] The invention relates to an electronic device that is connectable to a mobile radio station, such as a mobile telephone, said device comprising a housing that is mechanically as well as electrically connectable to the mobile radio station in a releasable manner and said device being provided with electronic communication components.

### Related prior art

[0002] Such electronic devices are known in a number of varieties. For instance, EP-A1-0 663 749 discloses a hands-free equipment for a mobile telephone comprising an extra loudspeaker and microphone that is connectable to the mobile telephone via a connector plug. This equipment is intended for use in a car and also includes a charger plug that can be plugged into a cigarette lighter charger socket. The extra loudspeaker may optionally be integral with the charger plug or with the connector plug, and the external microphone is connected to either of these via a cord. The device is not provided with any holding means for the mobile telephone itself, hence a separate holder must be provided or it can simply be put on a surface, e.g. the passenger seat. Since the equipment must be connected to the cigarette lighter charger socket of a car, its use is limited to the interior of a car.

[0003] Portable hands-free sets are also available. A portable hands-free set typically comprises a plug to be plugged into a standard socket of a mobile telephone, said plug being provided with a cord having a microphone provided with a clip attach to it at a certain distance from the plug and an earphone at its distant end. A person using this type of hands-free set carries the mobile telephone in a pocket or by means of some kind of clip provided at the rear side of the mobile telephone, and the microphone is attached to the clothing near the mouth by means of a clip. This type of hands-free set makes it possible for the user to do other things with his hands than to hold the mobile telephone while still talking on the mobile telephone. The known portable hands-free sets of this type allow only one person to communicate through the mobile telephone at a time.

[0004] DE-U1-299 11 295 discloses an accessory for a mobile telephone which is not electrically connected to the mobile telephone but only mechanically connected thereto. The accessory comprises fastening means for attaching the accessory to a mobile telephone and a loudspeaker that amplifies the sound from the speaker of the mobile telephone so that optionally other persons can listen in on the conversation. The accessory is not provided with any means for carrying the combined mobile telephone/accessory, hence it must be held by the hand or supported otherwise.

### Object of the invention

[0005] Many people - especially young people - often gather in groups and perform joint activities, professionally or privately. Communication through mobile radio stations, such as mobile telephones, has become increasingly popular and a need for communicating with other people when gathered in groups has appeared.

[0006] The hands-free equipment disclosed in EP-A1-0 663 749 must be connected to the cigarette lighter charger socket of a car and its use is therefore limited to the interior of a car, although it is possible for more people to participate in the telephone conversation at the same time. Another disadvantage of this equipment is that the mobile telephone must be held by the hand or by a separate holder for that particular mobile telephone.

[0007] With the accessory disclosed in DE-U1-299 11 295 it is possible for more than one person to listen to the telephone conversation and it is not limited for use in a particular environment. However, the accessory is not provided with any means for carrying the combined mobile telephone/accessory, hence it must be held by the hand or supported otherwise. Moreover, since the accessory is not connected electrically to the mobile telephone, it is provided with its own batteries and electronics for amplifying the sound generated by the mobile telephone. This adds considerably to the weight of the accessory which makes it unhandy.

[0008] It is therefore an object of the invention to provide an electronic device that is connectable to a mobile radio station, such as a mobile telephone, which device should be an easy-to-carry hands-free device whose use is not limited to any particular environment and which makes it possible to communicate via the mobile radio station in a novel way.

### Summary of the invention

[0009] The object of the invention is achieved by providing the electronic device mentioned in the opening paragraph with a neck-strap to be worn around the neck of a user of the mobile radio station and with connecting means adapted for firm connection between the device and the mobile radio station.

[0010] The electronic device according to the invention can therefore be worn around the neck of the user with the mobile radio station, such as a mobile telephone, firmly connected to the device. The mobile radio station then typically rests on the chest of the user and he has his hands free for doing other things. Furthermore, in this position other persons gathered around the user are able to communicate through the mobile radio station via the electronic communication components provided in the device according to the invention.

[0011] In a preferred embodiment the electronics comprise a loudspeaker that is integral with the housing of the device, which loudspeaker is adapted to emit

sound from the mobile radio station in an audible manner. By incorporating a loudspeaker in the device it is made possible for other persons standing near the user to listen in on the conversation.

[0012] A pushbutton for switching the loudspeaker on and off may be provided in order to optionally let other persons listen to the conversation, and in order not to be forced to put the mobile radio station to the ear when the loudspeaker is turned off the electronic device is provided with at least one earphone.

[0013] When the electronic device is provided with an earphone, the pushbutton preferably switches between the loudspeaker and the earphone. Thereby the user can easily switch from the loudspeaker where all persons standing nearby can listen in on the conversation to the earphone in order to have a more private conversation

[0014] The electronic device is preferably also provided with a microphone which, in the preferred embodiment, is integral with a housing arranged on the neck-strap at a distance from the housing of the device and a cord is incorporated in the neck strap between the housing of the device and the microphone. Since the microphone is arranged at the neck-strap it does not need a clip or the like which is generally the case for the known hands-free sets.

[0015] In the preferred embodiment a cord provided with at least one earphone extends from the housing with the built-in microphone. It is thereby avoided that a cord must be provided all the way from the electronic device to the earphone.

[0016] In addition to or instead of a loudspeaker and a microphone the electronic device may comprise a camera for recording still and/or moving images whereby the communication possibilities are increased considerably.

[0017] Furthermore, the electronic device may comprise electronic components for wireless communication with other electronic devices independently of the mobile radio station. This makes it possible to use the electronic device and the mobile radio station in a very flexible manner not known hitherto.

[0018] Preferably the electronic device is connectable to an interface connector provided on the mobile radio station. Most mobile radio stations are provided with some kind of standard interface connector which will make it possible to use the electronic device according to the invention with different mobile radio station models, at least from the same manufacturer.

[0019] It shall be emphasised that the term "comprise/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps components or groups thereof.

## Description of the drawings

[0020] The invention will be described in detail in the following with reference to the drawings in which

Fig. 1 shows a first embodiment of an electronic device according to the invention,

Fig. 2 shows the electronic device shown in Fig. 1 connected to a mobile telephone and worn around the neck of a user,

Fig. 3 shows a second embodiment of an electronic device according to the invention, and

Fig. 4 shows a third embodiment of an electronic device according to the invention.

## Detailed description of an embodiment of the invention

[0021] Fig. 1 shows a first embodiment of an electronic device 1 according to the invention. The device 1 comprises a housing 2 which has an opening featuring a loudspeaker 3.

[0022] The electronic device 1 is further provided with plug means for connecting the device 1 to a standard interface connector provided in a mobile radio station, such as a mobile telephone. In the present embodiment the plug means comprises terminal strips 4 and hooks 5, the terminal strips 4 being intended for electrically connecting the electronic device 1 to the mobile radio station and the hooks 5 being intended for mechanically connecting the electronic device 1 to the mobile radio station. Of course, the interface connector of the mobile radio station must be provided with plug means that are complementary to the plug means of the electronic device 1, i.e. terminal strips that are complementary with the terminal strips 4 of the electronic device 1 and openings that are engageable with the hooks 5. In the shown embodiment each hook 5 is designed as a closed-loop band that flexes laterally when it is plugged into the opening provided in the mobile radio station. The hook therefore snaps into the opening and provides a firm mechanical connection between the electronic device 1 and the mobile radio station.

[0023] The electronic device 1 is further provided with a neck strap 6 whose length may be adjusted by means of two adjustment buckles 7. A small housing 8 is provided at a suitable position of the neck strap 6, said housing comprising a built-in microphone 9 and being provided with a cord 10 having an earphone 11 at its distal end. A holder for the earphone 11 may be provided in the small housing 8 for holding the earphone when it is not in use (not shown). The small housing 8 is electrically connected to the housing 2 of the electronic device 1 via a cord incorporated in the neck strap 6.

[0024] Finally, the electronic device 1 is provided with pushbuttons 12,13 for operating the electronic device 1

when it is connected to a mobile radio station as it will be described in the following with reference to Fig. 2.

[0025] Fig. 2 shows the electronic device 1 according to the invention connected to a mobile telephone 14 and worn around the neck of a user 15. The mobile telephone 1 is provided with an interface connector at the bottom end - which is the case with most mobile telephones - which means that the mobile telephone will be in an inverted position, i.e. hanging upside down as shown in Fig. 2, when it is connected to the electronic device 1 and worn around the neck of the user 15. This requires a durable connection between the mobile telephone 14 and the electronic device 1 in order to prevent the mobile telephone 14 from being accidentally separated from the electronic device 1.

[0026] The small housing 8 with a built-in microphone 9 is positioned at the upper part of the chest of the user 15 at a suitable position for picking up speech of the user 15 and of other persons positioned nearby. The earphone 11 is plugged into the ear of the user 15.

[0027] The electronic device 1 according to the invention serves various purposes. For instance, it can be used as an ordinary hands-free set where the user 15 is able to make telephone conversations while having his hands free for doing other things. In this mode the electronic device 1 picks up speech from the user 15 by the microphone 9 and the user 15 listens in by the earphone 11.

[0028] The electronics of the device according to the invention communicate with the electronics of the mobile telephone in such a way that when a call arrives the user 15 simply has to press the pushbutton 12 in order to answer the call. This automatically puts the electronic device 1 in "hands-free mode" whenever the device is connected to the mobile telephone 14.

[0029] The electronic device 1 can be switched from "hands-free mode" to what may be called "group mode" where the microphone 9 picks up speech from the user 15 as well as from other persons standing nearby and where these other persons can listen in on the telephone conversation by means of the loudspeaker 3. Switching between the hands-free mode and the group mode is achieved by pressing the pushbutton 13.

[0030] When the electronic device 1 is set to group mode other persons standing nearby the user 15 can participate in the telephone conversation like a kind of conference call using a single mobile telephone 14 at one or both ends.

[0031] When the electronic device 1 is in group mode the user 15 does not need to use the earphone 11 and he may optionally remove it from the ear and possibly place it in a holder therefor provided in the small housing 8.

[0032] The inverted position of the mobile telephone 14 seems at a first glance to be quite extraordinary. However, when the user 15 wishes to dial a number or read a message on the display of the mobile telephone 14 he simply grips the mobile telephone 14 and lifts it from its hanging position shown in Fig. 2 whereby the mobile telephone 14 immediately assumes a proper position for dialling a number or reading the display.

[0033] The electronic device 1 may be provided with its own power source, such as one or more batteries. Preferably, however, the electronic device 1 is not provided batteries, but is powered by the battery of the mobile telephone 14 whenever the electronic device 1 is connected thereto. This exclusion of a battery in the electronic device 1 makes it possible to minimize the size as well as the weight of the electronic device 1.

[0034] Fig. 3 shows a second embodiment of an electronic device 21 according to the invention. The electronic device 21 comprises a number of elements that correspond to same elements of the electronic device 1 shown in Figs 1 and 2 and these elements will be referred to by the same reference numerals. The common elements are the housing 2, the opening featuring a loudspeaker 3, the terminal strips 4 and connecting hooks 5, the neck strap 6 with adjustment buckles 7, the small housing 8 with a built-in microphone 9 and a cord 10 for an earphone 11, and pushbuttons 12,13. Additionally, the electronic device 21 comprises a digital camera 22 for recording still and/or moving images that can be transmitted to another appliance via a mobile telephone and a small LCD 23 for displaying still and/or moving images received from another appliance. Only the lens of the digital camera 22 is shown, but it may also comprise a viewfinder or another display for showing the image that is recorded by the digital camera 22. A third pushbutton 24 is also provided for operating the digital camera 22.

[0035] The LCD 23 and other possible displays may be dispensed with in the electronic device 21 if it is possible to use a display of the mobile radio station for showing the above-mentioned images.

[0036] Fig. 4 shows a third embodiment of an electronic device 31 according to the invention. This device is equipped with the same common elements 2-13 as the electronic devices 1,21 shown in Figs 1-3 and they will not be described again. However, the electronic device 31 is also provided with electronic components for wireless communication with other electronic equipment independently of the mobile radio station.

[0037] These electronic components preferably comprise a transmitter 32 and a receiver 33 for use in a short-range radio-link that operates independently of the telecommunication of the mobile radio station. With such components incorporated in the electronic device 31 it is possible to communicate with other electronic equipment, e.g. other electronic devices 31, operating in accordance with a common protocol defining the provisions of the short-range radio-link. In this manner it is possible for more users of electronic devices 31 to communicate with each other within a short range without operating the mobile radio station as such.

[0038] The invention has been described with reference to three embodiments shown in the drawings.

However, the electronic device according to the invention may be varied in a number of ways without departing from the general idea of the invention. For instance, other communication means than the ones shown and described may be applied, e.g. an infrared transmitter and receiver or other light-emitting elements. Likewise, the earphone and/or microphone at the neck strap may be omitted since communication can be obtained otherwise, e.g. by means of a built-in microphone and loudspeaker provided in the housing of the electronic device.

[0039] Also, the connecting means for connecting the electronic device with the mobile radio station may be varied in accordance with the type of interface connector provided in the relevant mobile radio station.

## Claims

1. An electronic device (1;21;31) that is connectable to a mobile radio station, such as a mobile telephone (14), said device comprising a housing (2) that is mechanically as well as electrically connectable to the mobile radio station in a releasable manner and said device being provided with electronic communication components, **characterised in that** the device comprises a neck-strap (6) to be worn around the neck of a user (15) of the mobile radio station and connecting means (4,5) adapted for firm connection between the device and the mobile radio station.

2. An electronic device according to claim 1, **characterised in that** the device comprises a loudspeaker (3) that is integral with the housing (2) of the device, said loudspeaker (3) being adapted to emit sound from the mobile radio station in an audible manner.

3. An electronic device according to claim 2, **characterised in that** the device is provided with a push-button (13) for switching the loudspeaker (3) on and off.

4. An electronic device according to any one of claims 1-3, **characterised in that** the device is provided with at least one earphone (11).

5. An electronic device according to claim 4, **characterised in that** the device is provided with a push-button (13) for switching between the loudspeaker (3) and the earphone (11).

6. An electronic device according to any one of claims 1-5, **characterised in that** the device is provided with a microphone (9).

7. An electronic device according to claim 6, **characterised in that** the microphone (9) is integral with a housing (8) arranged on the neck-strap (6) at a distance from the housing (2) of the device; and that a cord is incorporated in the neck strap (6) between the housing (2) of the device and the microphone (9).

8. An electronic device according to claim 7, **characterised in that** a cord (10) provided with at least one earphone (11) extends from the housing (8) with the built-in microphone (9).

9. An electronic device according to any one of claims 1-8, **characterised in that** the device comprises a camera (22) for recording still and/or moving images.

10. An electronic device according to any one of claims 1-9, **characterised in that** the device comprises electronic components (32,33) for wireless communication with other electronic devices independently of the mobile radio station.

11. An electronic device according to any one of claims 1-10, **characterised in that** the device is connectable to an interface connector provided on the mobile radio station.

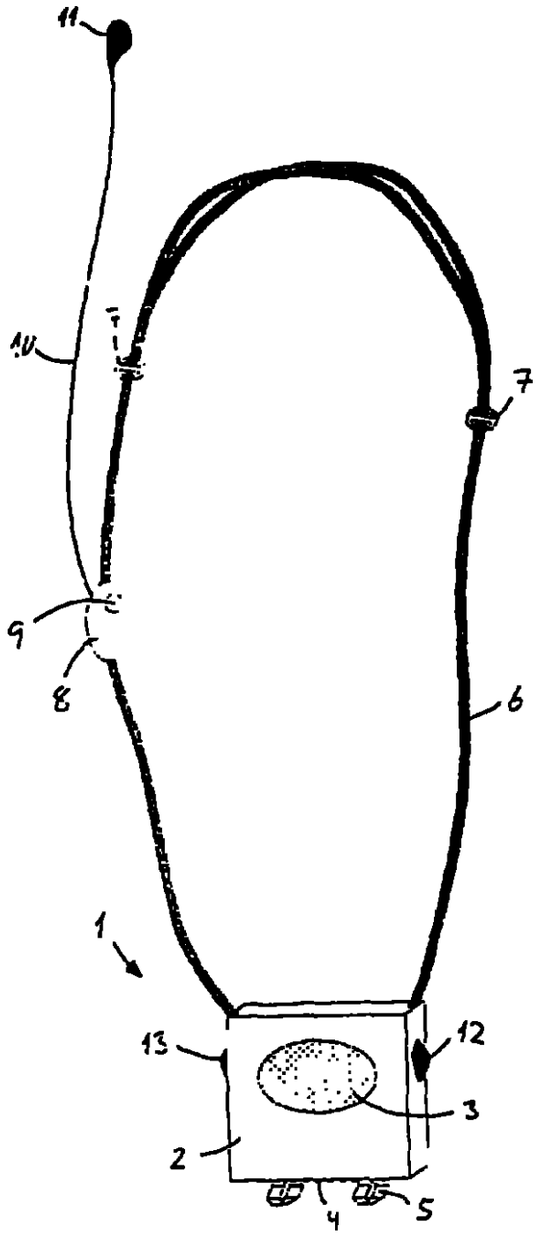


Fig. 1

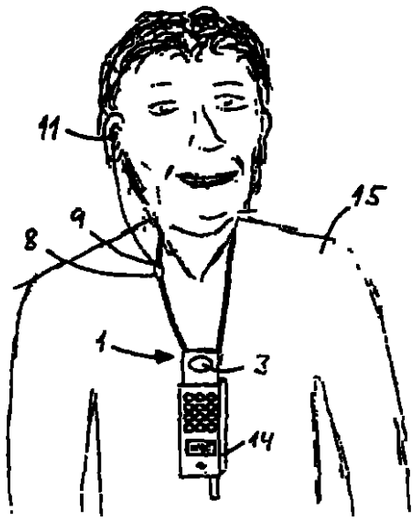


Fig. 2

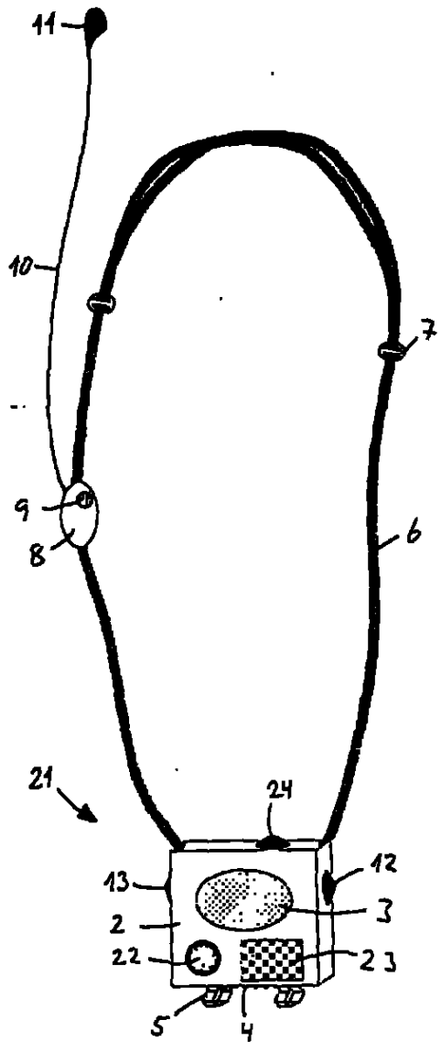


Fig.3

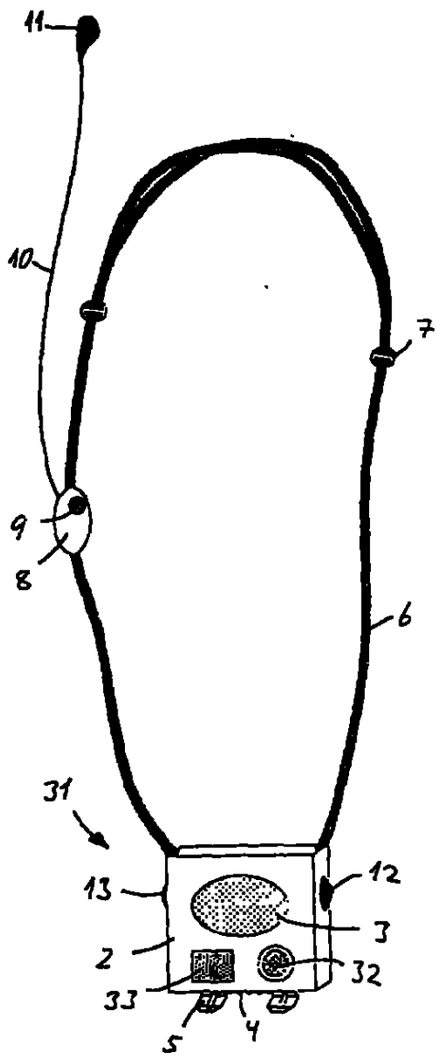


Fig.4

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 00 61 0140

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
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| D,A | DE 299 11 295 U (HIRSCH MARIA ;ROSENMAIER FRANZ E (AT); MLAKAR PETER R (DE)) 17 February 2000 (2000-02-17) * abstract; claim 1; figure 1 * | 1-11 | |
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H04B
H04M
B60R
A45F

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| MUNICH | 5 April 2001 | Kolbe, W |

CATEGORY OF CITED DOCUMENTS

X particularly relevant if taken alone
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T : theory or principle underlying the invention
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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 61 0140

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-04-2001

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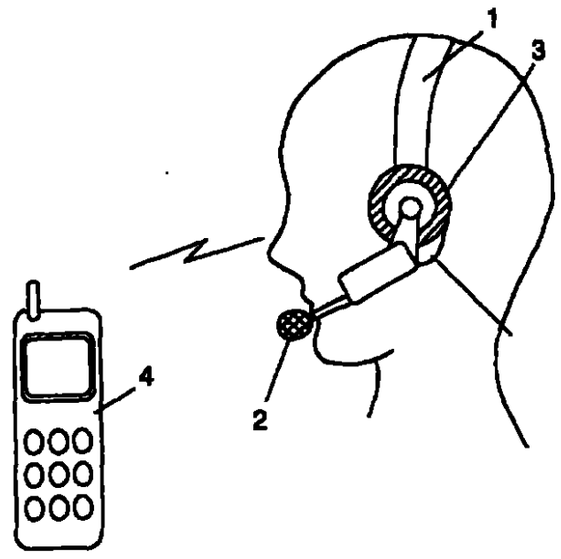
*[Continued on next page]*

(54) Title: WIRELESS HEADSET AND COMMUNICATION SYSTEM




(57) Abstract: In a headset worn on a user, a user's voice is input to a microphone, and a controller compares an output signal of the microphone and first reference data, and the telephone is set off the hook by the output of the control section. During speech, the controller compares speech data and second reference data, and changes a gain of a second amplifier for driving a loudspeaker according to the difference between the data. When a volume of each of partner's voice and user's voice is smaller than a predetermined volume, the controller outputs a warning sound from the loudspeaker. After a predetermined time lapses, the telephone is set back on hook. In a communication system including the headset and telephone, the headset does not require a speech switch, a voice-volume-increase switch, or a voice-volume-decrease switch. Preferably the headset is a wireless headset using the Bluetooth standard.

WO 03/055183 A1

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# DESCRIPTION

## WIRELESS HEADSET AND COMMUNICATION SYSTEM

## TECHNICAL FIELD

The present invention relates to a communication terminal such, as a wireless headset, wireless-connected to a communication device, and to a communication system including the terminal, such as an Internet telephone system, a car-mount hands-free system, a credit processing system, and a cash service system.

## BACKGROUND ART

Fig. 6 shows a conventional wireless headset system conforming to the Bluetooth standard, which excludes a cable connecting the headset and a cellular telephone. The system includes a wireless headset 100 and a cellular telephone 160 for mutually transmitting and receiving data. The wireless headset 100 includes a microphone 110, a loudspeaker 120, a speech switch 130, a voice-volume-increase switch 140, and a voice-volume-decrease switch 150.

When the cellular phone 160 receives a call, a user must push the speech switch 130 of the wireless headset 100 to set the telephone to off-hook. If a volume level from the loudspeaker 120 is low during service, the user must push the switch 140 at the wireless headset 100 to increase the volume level. If the volume level from the loudspeaker 120 is high, the user must push the switch 150 at the wireless headset 100 to decrease the volume level. When the speech is over, the user must push the speech switch 130 to set the

telephone to on-hook.

Thus, upon start of speech, during speech, and at the end of speech, the user must manipulate the speech switch 130, switch 140, and switch 150 provided in the wireless headset 100 according to circumstances. However, the speech switch 130, switch 140, and switch 150 provided at the wireless headset 100, since being usually arranged in a narrow space, causes an error in manipulation by blind touch.

## SUMMARY OF THE INVENTION

A communication terminal is used together with a communication device. The the communication terminal includes a communication section for transmitting and receiving a signal with the communication device, a microphone for sending an input first voice to the communication section, an amplifier for receiving an output of the communication section, an electro-acoustic transducer connected to an output of the amplifier, a storage section for storing first reference data (W), second reference data (Y), third reference data (Z), upper limit reference data, and lower limit reference data being smaller than the upper limit reference data, and a controller. The controller is operable to allow the communication section to transmit a first signal for starting communication at the communication device to the communication device if first data corresponding to a volume of the input first voice is greater than the first reference data (W), to increase a gain of the amplifier according to a difference between the first data and the upper limit reference data if the first data exceeds the upper limit reference data, to set the gain to a predetermined gain if the first data is between the upper limit reference data and lower limit reference data, to decrease the gain according to a difference between the first data and the lower limit reference data if the

first data is smaller than the lower limit reference data, to output a warning if second data transmitted from the communication device through the communication section is smaller than the third reference data (Z) and the first data is smaller than the second reference data (Y), and to allow the communication section to output a second signal for terminating communication with the communication device if the first and second data are smaller than the second reference data (Y) and the third reference data (Z), respectively, when a predetermined time lapses after the warning starts to be output.

This wireless headset does not include a speech switch, a voice-volume-increase switch or a voice-volume-decrease switch which are likely to be mishandled in the prior art.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic diagram of a communication system including a wireless headset and a cellular telephone according to exemplary embodiment 1 of the present invention.

Fig. 2 is a schematic diagram of the wireless headset according to embodiment 1.

Fig. 3 is a schematic diagram of a wireless headset according to exemplary embodiment 2 of the invention.

Fig. 4A is a formant-frequency characteristic diagram of a user used in a wireless headset according to exemplary embodiment 3 of the invention.

Fig. 4B shows difference in each vowel of the formant-frequency characteristic in the wireless headset according to embodiment 3.

Fig. 5 is a schematic diagram of a credit processing system including a wireless headset and a communication device according to exemplary

embodiment 4 of the invention.

Fig. 6 is a schematic diagram of a conventional communication system including a wireless headset and a cellular telephone.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

(Exemplary Embodiment 1)

Fig. 1 is a schematic diagram of a communication system including a wireless headset and a cellular telephone according to exemplary embodiment 1 of the present invention. Fig. 2 is a schematic diagram of the wireless headset. The communication system includes a cellular telephone 4 as a communication device and a wireless headset 1. The wireless headset 1 includes a microphone 2 and a loudspeaker 3 as an electro-acoustic transducer. A communication section 5 performs wireless transmission and reception of data conforming to, for example, the Bluetooth standard with the cellular telephone 4. A voice compression/decompression unit (CODEC) 6 is connected to the communication section 5, and a first amplifier 7 is connected to the voice CODEC 6. The microphone 2 is connected to the first amplifier 7. A loudspeaker 3 is connected to a second amplifier 8 connected to the voice CODEC 6. A storage section 10 is connected to a controller 9 connected to the communication section 5. An analog-digital (A/D) converter 11 is provided between the controller 9 and the first amplifier 7. A digital-analog (D/A) converter 12 is connected between the controller 9 and the second amplifier 8.

An off-hook operation in the wireless headset 1 for starting communication by using the cellular telephone 4 will be explained. The storage section 10 preliminarily stores predetermined first reference data (W), basic data (X), allowable data (ε), second reference data (Y), and third

reference data (Z). The controller 9 determines fifth reference data (X-ε) and sixth reference data (X+ε) on the basis of the basic data (X) and the allowable data (ε) stored in the storage section 10. The communication section 5 receives an incoming signal from the cellular telephone 4, and sends a signal corresponding to this incoming signal into the voice CODEC 6. The voice CODEC 6 sends an output signal to the second amplifier 8, and the second amplifier 8 amplifies this signal, and drives the loudspeaker 3. Upon the loudspeaker 3 being driven, a user speaks to the microphone 2, and the signal corresponding to this voice is issued from the microphone 2 into the first amplifier 7. The output signal of the first amplifier 7 is A/D-converted by the A/D converter 11. The controller 9 compares the volume of a voice of the user with the first reference data (W) stored in the storage section 10 based on voice data output by the A/D converter 11. When the volume is greater than the first reference data (W), the controller 9 outputs an off-hook signal for starting communication with the cellular telephone 4 to the communication section 5, that is, for setting the cellular telephone 4 to off-hook, and sets the telephone 4 to a speech mode. This eliminates a speech switch for setting a conventional telephone to off-hook is no longer needed.

An operation of the communication system in the speech mode will be explained. After the speech mode starts, the voice of the user is input to the microphone 2 and is further sent to the first amplifier 7. The A/D converter 11 A/D-converts the output of the first amplifier 7. The controller 9 compares a speech data corresponding to the volume of the A/D converted voice with the fifth and sixth reference data. When the speech data exceeds the sixth reference data (X+ε), the controller 9 increases a gain of the second amplifier 8 for driving the loudspeaker 3 according to the difference between

the speech data and the sixth reference data (X+ε), i.e., upper limit data. When the speech data is between the fifth reference data (X-ε), i.e., lower limit data, and the sixth reference data (X+ε), the controller 9 sets the gain of the second amplifiers 8 to a predetermined gain. When the speech data is smaller than the fifth reference data (X-ε), the controller 9 decreases the gain of the second amplifier 8 according to the difference between the speech data and the data (X-ε). This operation eliminates hitherto-required voice-volume-increase switch and voice-volume-decrease switch are no longer needed.

A communication terminating procedure in the wireless headset through the cellular telephone 4 in the speech mode, that is, an on-hook operation for setting the cellular telephone 4 to on-hook will be explained. The voice of the user from the microphone 2 is input to the first amplifier 7, and the output of the first amplifier 7 is A/D-converted by the A/D converter 11. The controller 9 compares speech data corresponding to the volume of the A/D-converted voice with the second reference data (Y) stored in the storage section 10. The controller 9 then compares voice data corresponding to the volume of the voice transmitted from the cellular telephone 4 through the communication section 5 with the third reference data (Z) stored in the storage section 10. When the speech data and voice data are smaller than the second reference data (Y) and third reference data (Z), respectively, the controller 9 outputs a warning sound to the user through the loudspeaker 3. When a predetermined time lapses after the warning sound is output, and when the speech data and voice data are still smaller than the second reference data (Y) and third reference data (Z), respectively, the controller 9 sends an on-hook signal to the communication section 5 for terminating the communication through the cellular telephone 4, that is, for setting the

cellular telephone 4 to on-hook. This operation eliminates a speech switch in a conventional telephone to be set to on-hook is no longer needed.

Having such configuration, the wireless headset of embodiment 1 does not require the speech switch, the voice-volume-increase switch, or the voice-volume-decrease switch.

According to embodiment 1, the controller 9 may compare an average per unit time of the speech data of the user with the fifth reference data (X-ε) and sixth reference data (X+ε). When the average is not between the fifth reference data (X-ε) and the sixth reference data (X+ε), the controller 9 updates the basic data (X) into the average. When the average is between the fifth reference data (X-ε) and the sixth reference data (X+ε), the control section 9 does not update the basic data (X). This operation prevents the gain of the second amplifier 8 for driving the loudspeaker 3 from changing due to sudden increase or decrease of voice volume of the user.

According to embodiment 1, a call mode, for calling the user, preliminarily selected in the cellular telephone 4 may be sent to the communication section 5 of the wireless headset 1 through the cellular telephone 4. The call mode may be stored in the storage section 10. This arrangement eliminates a switch for selecting the call mode in the wireless headset 1.

According to embodiment 1, a loudspeaker having a vibrating function as the electro-acoustic transducer allows the headset to call the user in the call mode, i.e., either by vibration or incoming sound, according to environment.

According to embodiment 1, a bone conduction microphone, upon being used as the microphone, decreases a noise input into the microphone.

(Exemplary Embodiment 2)

Fig. 3 is a schematic diagram of a wireless headset according to exemplary embodiment 2 of the invention. In embodiment 2, the same element as in embodiment 1 are denoted by the same reference numerals, and is not described in detail. A wireless headset 20 has a bone conduction loudspeaker 21. The bone conduction loudspeaker 21, upon being used as an electro-acoustic transducer, allows the ear of the user not to be closed for transmitting a voice sent from the cellular telephone 4 to a user through a communication section 5. This allows the user to feel free, and allows the user to react quickly in case of emergency information or other information. The bone conduction loudspeaker 21 may be placed at a position around the ear, not limited to a position ahead of the ear. The bone conduction loudspeaker 21, upon being placed so as to apply pressure to the head of the user, enhances the efficiency of transmitting voice to the user.

(Exemplary Embodiment 3)

Fig. 4A and Fig. 4B are formant-frequency characteristic diagrams of a user used in a wireless headset according to exemplary embodiment 3 of the invention. Fig. 4A shows first, second, and third formant frequencies each expressing a consonant portion, a transition portion from the consonant portion to a vowel portion, and the vowel portion of a voice of the user. Fig. 4B shows the first, second, and third formant frequencies of each of vowels, "i", "e", "a", "o", and "u". Characteristics of the first, second, and third formant frequencies vary depending on each user, thus being utilized in the wireless headset according to embodiment 1.

An operation of this arrangement will be explained.

The voice of the user is transmitted through the microphone 2, first

amplifier 7, and A/D converter 11, and a frequency spectrum of the voice is analyzed in the controller 9. The controller 9 registers data of the analyzed voice in the storage section 19 as formant-frequency data. This arrangement allows the headset according to embodiment 8 to perform various processes on the basis of the formant-frequency data specifying the user.

An operation for the processes will be explained in detail

The controller 9 processes the formant-frequency data stored in the storage section 10 to provide a 128-bit personal identification number (PIN) code. Upon being utilized in authentication for wireless connection between the wireless headset 1 and the cellular telephone 4 conforming to the Bluetooth standard, the PIN code provides a connection authentication with high security without any particular input device or peripheral device for inputting the PIN code.

After the cellular telephone is changed to a speech mode, the frequency spectrum of the voice of the user transmitted through a microphone 2, a first amplifier 7 and an A/D converter 11 may be analyzed by the controller 9. The controller 9 compares the analyzed data with the formant-frequency data of the user stored in the storage section 10. When the analyzed data includes the stored formant-frequency data, the controller 9 may a gain of a second amplifier 8 for driving the loudspeaker 3 depending on the volume of the voice of the user.

(Exemplary Embodiment 4)

Fig. 5 is a schematic diagram of a communication system for credit processing including a wireless headset and a communication device according to exemplary embodiment 4 of the invention. In embodiment 4,

the same elements as in embodiment 1 are denoted by the same reference numerals, and are not described in detail.

The system including a wireless headset 1 and a terminal device 31 which is installed at a register counter 30 for credit processing as a communication device wireless-connected to the wireless headset 1 conforming to the Bluetooth standard. In the credit processing system, a Bluetooth address is used as a personal identification number for the credit processing, allows the user not only to make voice and data communications utilizing features of the Bluetooth standard, but also to enloy shopping quickly at a store without a credit card or the like.

The communication system of embodiment 4 may includes a wireless headset and a communication device having a cash service processing function of wireless connection conforming to the Bluetooth standard instead of the terminal device 31 for credit processing. In this system, the Bluetooth address is used as a personal identification number for receiving cash service. Further, the PIN code may be used as a password for receiving cash service, thus providing a cash service system capable of not only communicating voice and data conforming to the Bluetooth standard, but also providing prompt and high security cash service without a credit card.

The wireless headset according to embodiments 1 to 3 may be incorporated in a helmet, thus allowing the user to wear the helmet when both hands are occupied during work, and voice and data communication is realized without requiring switch manipulation.

In an Internet telephone system including the wireless headset according to embodiments 1 to 3 and the communication device wireless-connected to the wireless headset having an Internet telephone function, the user can make a telephone call without manipulating a switch on the

wireless headset by hand while working with both hands.

In a vehicle hands-free system for motorcycles or automobiles including the wireless headset according to embodiments 1 to 3 and the communication device wireless-connected to the wireless headset having a telephone function, the user can make voice and data communications without manipulating a switch on the wireless headset by hand while driving the vehicle. In particular, a wireless headset having a bone conduction loudspeaker allows the user to feel free and to react quickly in case of emergency information or other information.

In embodiments 1 to 4, the cellular telephone, terminal device for credit processing, and terminal device for cash service are explained as the communication device, but not limited to them, the technique is applicable to various communication device, such as a PDA, a personal computer, a small portable terminal.

In embodiments 1 to 4, the wireless connection between the wireless headset system and the communication device is considered to be only the Bluetooth standard, but not limited to this. The connection may conform to other wireless connection standards, such as IEEE802.11a, IEEE802.11b, or IEEE wireless 1394 standard. As a result, high speed communication of voice and data is realized.

In embodiments 1 to 4, the wireless headset may be any portable wireless-communication terminal and a wired communication terminal connected to the communication device.

## INDUSTRIAL APPLICABILITY

As described herein, the invention provides a wireless communication terminal not requiring a speech switch, a voice-volume-increase switch, or a

voice-volume-decrease switch.

## CLAIMS

1. A communication terminal used together with a communication device, said communication terminal comprising:

a communication section for transmitting and receiving a signal with said communication device;

a microphone for sending an input first voice to said communication section;

an amplifier for receiving an output of said communication section;

an electro-acoustic transducer connected to an output of said amplifier;

a storage section for storing first reference data (W), second reference data (Y), third reference data (Z), upper limit reference data, and lower limit reference data being smaller than said upper limit reference data; and

a controller operable to:

allow said communication section to transmit a first signal for starting communication at said communication device to said communication device if first data corresponding to a volume of said input first voice is greater than said first reference data (W);

increase a gain of said amplifier according to a difference between said first data and said upper limit reference data if said first data exceeds said upper limit reference data;

set said gain to a predetermined gain if said first data is between said upper limit reference data and lower limit reference data;

decrease said gain according to a difference between said first data and said lower limit reference data if said first data is smaller

than said lower limit reference data;

output a warning if second data transmitted from said communication device through said communication section is smaller than said third reference data (Z) and said first data is smaller than said second reference data (Y); and

allow said communication section to output a second signal for terminating communication with said communication device if said first and second data are smaller than said second reference data (Y) and said third reference data (Z), respectively, when a predetermined time lapses after said warning starts to be output.

2. The communication terminal of claim 1,

wherein said storing section stores basic data (X) and allowable data (ε), and

wherein said controller is operable to determine said lower limit reference data and said upper limit reference data as fifth reference data (X-ε) and sixth reference data (X+ε) with using said basic data (X) and said allowable data (ε), respectively.

3. The communication terminal of claim 2, wherein said controller is operable to update said basic data (X) according to said first data.

4. The communication terminal of claim 3, wherein said controller is operable to:

determine an average per a certain time of said first data,

update said basic data (X) to said average if said average is not between said fifth reference data (X-ε) and said sixth reference data (X+ε),

and

maintain said basic data (X) if said average is between said fifth reference data (X-ε) and said sixth reference data (X+ε).

5. The communication terminal of claim 1, wherein said electro-acoustic transducer comprises a bone conduction loudspeaker.

6. The communication terminal of claim 5, wherein said bone conduction loudspeaker is located near an ear of a user.

7. The communication terminal of claim 6, wherein said bone conduction loudspeaker is located so as to pressurize a head of said user.

8. The communication terminal of claim 1, wherein said controller is operable to:

analyze a frequency spectrum of a second voice input through said microphone, and

determine first formant-frequency data based on said analyzed frequency spectrum of said second voice

9. The communication terminal of claim 8, wherein said control section is operable to register said determined first formant frequency data in said storage section.

10. The communication terminal of claim 9, wherein said control section is operable to

analyze a frequency spectrum of said first voice to determine

second formant frequency data, and

adjust said gain according to said first data if said second formant frequency data includes said first formant frequency data.

11. The communication terminal of claim 8, wherein said first formant frequency data is utilized as a personal identification number (PIN) code.

12. The communication terminal of claim 11,

wherein said communication section transmits and receives a signal with said communication device by wireless conforming to the Bluetooth standard, and

wherein said communication device comprises a cash service processing function using a Bluetooth address as a personal identification number when receiving cash service, and using said PIN code as a password when receiving said cash service.

13. The communication terminal of claim 11, wherein said control section is operable to determine said PIN code based on said first formant frequency data.

14. The communication terminal of claim 1, wherein said communication section transmits and receives a signal with said communication device by wireless.

15. The communication terminal of claim 14, wherein said communication section transmits and receives a signal with said

communication device by wireless conforming to the Bluetooth standard.

16. The communication terminal of claim 15, wherein said communication section comprises a credit processing function using a Bluetooth address as a personal identification number for credit processing.

17. The communication terminal of claim 14, wherein said communication section transmits and receives a signal with said communication device by wireless conforming to one of the IEEE802.11a standard, the IEEE802.11b standard, and the IEEE wireless 1394 standard.

18. The communication terminal of claim 1, wherein said microphone comprises a bone conduction microphone.

19. The communication terminal of claim 1,

wherein said communication device transmits third data indicating a call mode for informing a user of an incoming call to said communication section, and

wherein said control section is operable to store said transmitted third data in said storage section.

20. The communication terminal of claim 19, wherein said call mode informs said user of said incoming call by one of vibration and an incoming sound.

21. A helmet comprising:

said communication terminal of claim 1; and

a helmet main body having said communication terminal mounted thereto.

22. An Internet telephone system comprising:

said communication terminal of claim 1; and

said communication device,

wherein said communication device has an Internet telephone function.

23. A vehicle hands-free system comprising:

said communication terminal of claim 1; and

said communication device.

24. A communication system comprising:

said communication terminal of claim 11, and

said communication device,

wherein said communication device uses said PIN code based on said first formant frequency data for an authentication at a wireless connection with said communication terminal.

25. A cash service system comprising:

said communication terminal of claim 11; and

said communication device,

wherein said communication device has a cash service processing function using a Bluetooth address as a personal identification number when receiving cash service, and using said PIN code as a password when receiving said cash service.

26. A credit processing system comprising:

said communication terminal of claim 12; and

said communication device.

FIG. 1

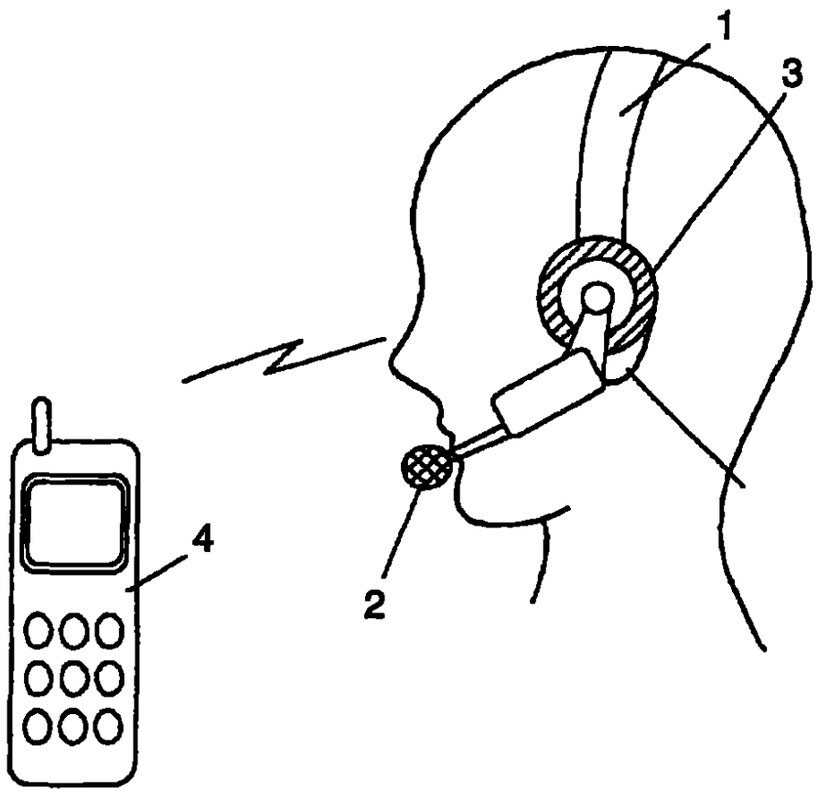


FIG. 2

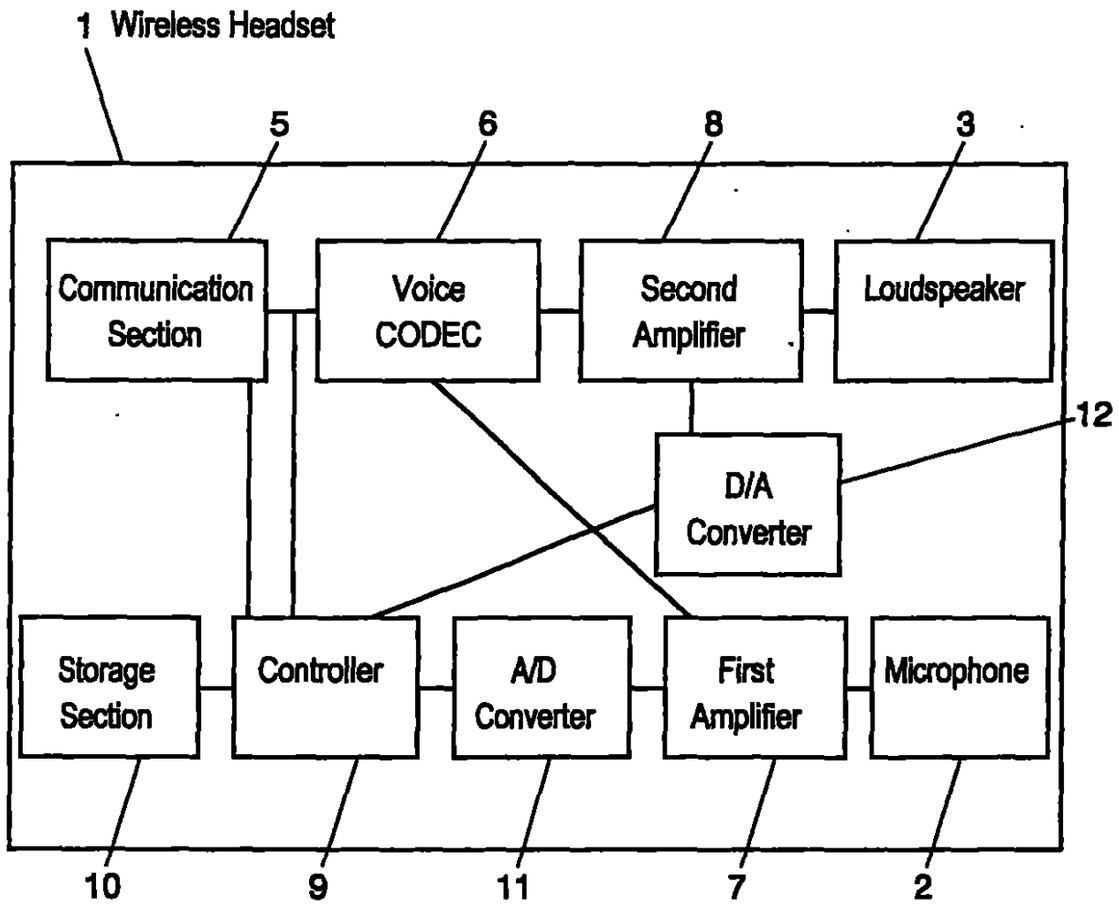


FIG. 3

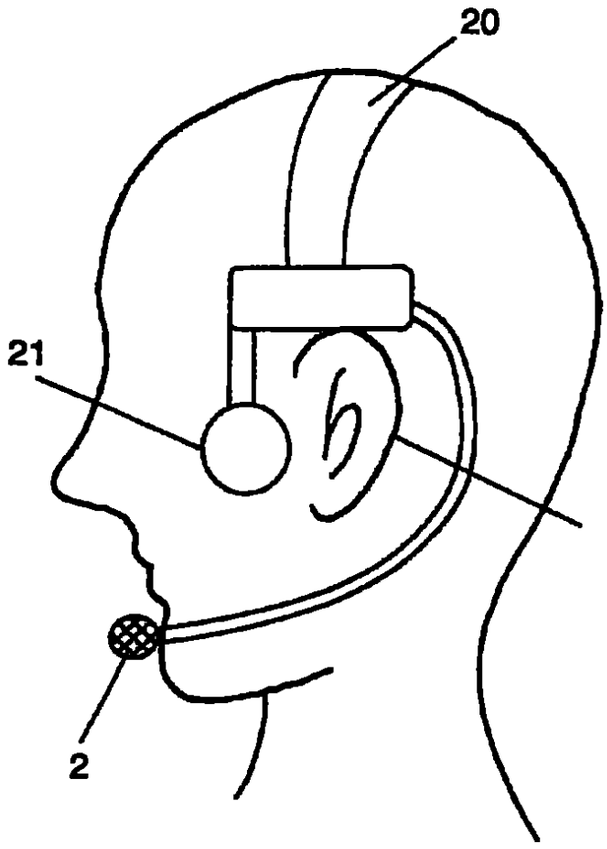


FIG. 4A

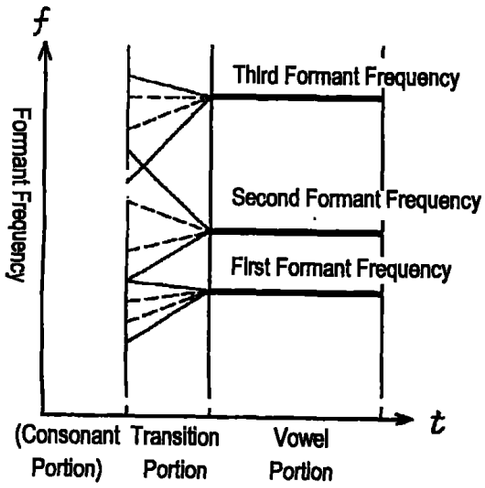

f
Formant Frequency
Third Formant Frequency
Second Formant Frequency
First Formant Frequency
t
(Consonant Portion)
Transition Portion
Vowel Portion

FIG. 4B

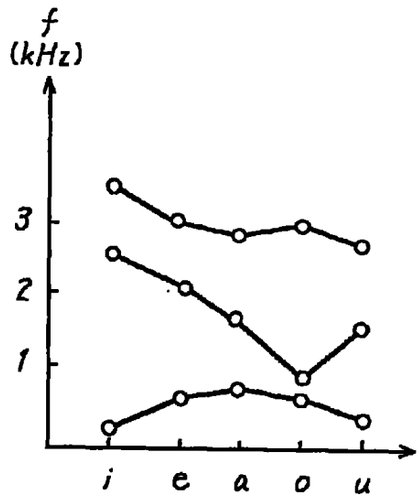

f
(kHz)
3
2
1
i
e
a
o
u

FIG. 5

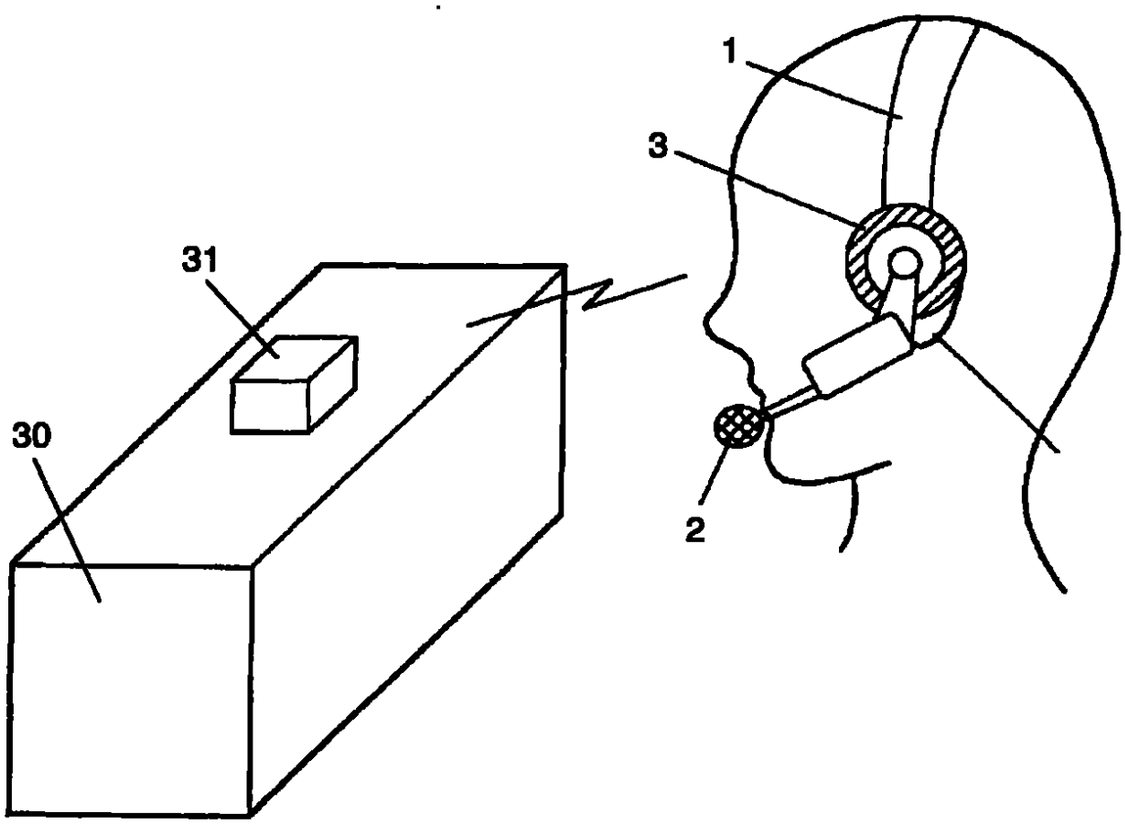
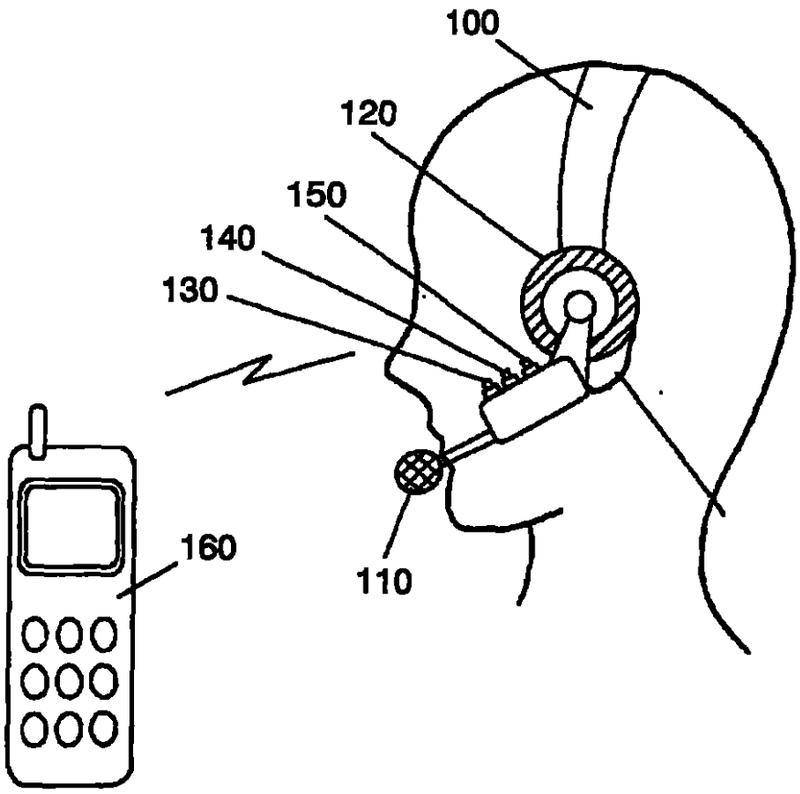


FIG. 6



Reference Numerals

1 Wireless Headset
2 Microphone
3 Loudspeaker
4 Cellular Telephone
5 Communication Section
6 Voice CODEC
7 First Amplifier
8 Second Amplifier
9 Controller
10 Storage Section
11 A/D Converter
12 D/A Converter
20 Wireless Headset
21 Bone Conduction Loudspeaker
30 Register Counter
31 Terminal Device

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 02/13241

109

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/60 H03G3/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M H03G H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | WO 01 78414 A (BUSSAN C ET AL)<br>18 October 2001 (2001-10-18)<br>abstract<br>page 3, line 11 -page 6, line 9<br>figures 1,2 | 1-26 |
| Y | GB 2 336 073 A (SATOSHI B)<br>6 October 1999 (1999-10-06)<br>abstract<br>page 4, line 4 -page 5, line 12<br>page 13, line 1 -page 16, line 11<br>page 24, line 24 -page 26, line 4<br>claims 1-3<br>figures 1,6-8 | 1-7,<br>14-26 |

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 25 April 2003 | 12/05/2003 |

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1

Form PCT/ISA/210 (second sheet) (July 1992)

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|---|---|---|---|---|---|---|---|
| 60/535,314 | 01/09/2004 | | 80 | 4848-00296 | 13 | | |

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ANDRUS, SCEALES, STARKE & SAWALL, LLP
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100 East Wisconsin Avenue
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FILING RECEIPT

*OC000000011822267*

Date Mailed: 02/04/2004

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**Applicant(s)**

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Mandy M. Johnson, Milwaukee, WI;

**If Required, Foreign Filing License Granted:** 02/03/2004

**Projected Publication Date:** None, application is not eligible for pre-grant publication

**Non-Publication Request:** No

**Early Publication Request:** No

** SMALL ENTITY **

**Title**

Hands-free personal communication device

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Office of Export Administration, Department of Commerce (15 CFR 370.10 (j)); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

#13

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPL NO. | FILING OR 371 (c) DATE | ART UNIT | FIL FEE RECD | ATTY.DOCKET NO | DRAWINGS | TOT CLMS | IND CLMS |
|---|---|---|---|---|---|---|---|
| 11/029,911 | 01/05/2005 | 2681 | 1780 | 4848-00329 | 8 | 33 | 3 |

CONFIRMATION NO. 1624

26753
ANDRUS, SCEALES, STARKE & SAWALL, LLP
100 EAST WISCONSIN AVENUE, SUITE 1100
MILWAUKEE, WI 53202

UPDATED FILING RECEIPT

*OC000000015667028*

Date Mailed: 04/06/2005

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

**Applicant(s)**

Christopher C. Gantz, Northbrook, IL;
Mandy M. Johnson, Milwaukee, WI;
Allan G. Mlodzikowski, Muskego, WI;

**Power of Attorney:** None

**Domestic Priority data as claimed by applicant**

This application is a CIP of 10/218,277 08/14/2002
and claims benefit of 60/535,314 01/09/2004

**Foreign Applications**

**If Required, Foreign Filing License Granted:** 02/22/2005

**The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US11/029,911**

**Projected Publication Date:** 07/14/2005

**Non-Publication Request:** No

**Early Publication Request:** No

1(A

**Title**

Hands-free personal communication device

**Preliminary Class**

455

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## LICENSE FOR FOREIGN FILING UNDER
## Title 35, United States Code, Section 184
## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Office of Export Administration, Department of Commerce (15 CFR 370.10 (j)); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

AUGUST 25, 2004

PTAS

*102686712A*

ANDRUS, SCEALES, STARKE ET AL
JOSEPH J. JOCHMAN
100 EAST WISCONSIN AVENUE
MILWAUKEE, WI 53202

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, CG-4, 1213 JEFFERSON DAVIS HWY, SUITE 320, WASHINGTON, D.C. 20231.

RECORDATION DATE: 03/04/2004 REEL/FRAME: 015031/0481
NUMBER OF PAGES: 2

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).
DOCKET NUMBER: 4848-00296

ASSIGNOR:
GANTZ, CHRISTOPHER C. DOC DATE: 02/19/2004

ASSIGNOR:
JOHNSON, MANDY M. DOC DATE: 02/19/2004

ASSIGNEE:
KOSS CORPORATION
4129 N. PORT WASHINGTON AVENUE
MILWAUKEE, WISCONSIN 53212

SERIAL NUMBER: 60535314 FILING DATE: 01/09/2004
PATENT NUMBER: ISSUE DATE:
TITLE: HANDS-FREE PERSONAL COMMUNICATION DEVICE

116

LAZENA MARTIN, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

117 ttA

Attorney Docket No.: 4848-00296

Form U.S. Patent and Trademark Office-1595
1-31-92

U.S. Department of Commerce
Patent and Trademark Office

RECORD 03-08-2004

102686712

To the Honorable Commissioner of Patents and T
Please record the attached original documents or

1. Name of conveying party(ies):

3/4/04

Christopher C. Gantz
Mandy M. Johnson

Additional name(s) of conveying party(ies) attached?
[ ] Yes [X] No

2. Name and address of receiving party(ies):

Koss Corporation
4129 N. Port Washington Avenue
Milwaukee, WI 53212
U.S.A.

Additional name(s) and address(es) attached?
[ ] Yes [X] No

3. Nature of Conveyance:
[X] Assignment [ ] Merger
[ ] Security Agreement [ ] Change of Name
[ ] Other _____

Execution Date(s): 2/19/2004

2004 MAR -4 AM 7:44
OPR/FINANCE

4. Application number(s) or patent number(s):

If this document is being filed with a new application, the execution date of the application is _____

A. Patent Application No(s).

60/535,314

B. Patent No(s).

Additional numbers attached? [ ] Yes [X] No

5. Name and address of party to whom correspondence concerning document should be mailed:

Joseph J. Jochman
ANDRUS, SCEALES, STARKE & SAWALL, LLP
100 East Wisconsin Avenue, Suite 1100
Milwaukee, WI 53202

6. Total number of applications and patents involved: 1

7. Total fee (37 CFR 3.41) . . . . . $40.00
[X] Enclosed
[ ] Authorized to charge Deposit Account

8. Deposit Account No. 01.2000
(Attach duplicate copy of this page if paying by Deposit Account)

9. Statement and signature.

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Barbara A. Johnson — Barbara A Johnson — 3/1/2004
Name of Person Signing — Signature — Date

Total number of pages including cover sheet, attachments and document: 2

OMB No. 0651-0011 (exp. 4/94)

03/05/2004 BRETCHE 00000061 60535314
01 FC:181 40.00 OP

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# ASSIGNMENT

WHEREAS,

Christopher C. Gantz
Mandy. M. Johnson

(hereinafter referred to as ASSIGNORS),

have invented certain new and useful improvements entitled:

HANDS-FREE PERSONAL COMMUNICATION DEVICE

for which invention a provisional application for Letters Patent of the United States of America was filed on 01/09/2004 and assigned Serial No. 60/535,314.

AND WHEREAS

KOSS CORPORATION, a Delaware corporation,
4129 North Port Washington Avenue
Milwaukee, WI 53212

(hereinafter referred to as ASSIGNEE) is desirous of acquiring said invention, said provisional application and any non-provisional application based thereon;

NOW THEREFORE, be it known by all whom it may concern, that in consideration of the payment by ASSIGNEE to ASSIGNORS of the sum of ONE DOLLAR ($1.00), and other good and valuable consideration, the receipt of which is hereby acknowledged, ASSIGNORS hereby sell, assign and transfer to ASSIGNEE for the territory of the United States of America and foreign countries, their full and exclusive right, title and interest to said invention and provisional application, to be held and enjoyed by the ASSIGNEE as fully and entirely as the same would have been held by ASSIGNORS had this assignment and sale not been made.

In witness whereof, executed by the undersigned this 19 day of February, 2004.

Christopher C. Gantz

Mandy M. Johnson

RECORDED PTO
DATE: 3-4-04
REEL. 15031
FRAMES: 481-482

119

UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE





MARCH 25, 2006

PTAS

DOCKET CLERK
P.O. DRAWER 800889
DALLAS, TX 75380



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PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 571-272-3350. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, MAIL STOP: ASSIGNMENT SERVICES BRANCH, P.O. BOX 1450, ALEXANDRIA, VA 22313.

RECORDATION DATE: 12/09/2005
REEL/FRAME: 017363/0859
NUMBER OF PAGES: 5

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).
NIL

ASSIGNOR:
GANTZ, CHRISTOPHER C.
DOC DATE: 11/29/2005

ASSIGNOR:
JOHNSON, MANDY M.
DOC DATE: 12/02/2005

ASSIGNOR:
MLODZIKOWSKI, ALLAN G.
DOC DATE: 12/02/2005

ASSIGNEE:
KOSS CORPORATION
4129 NORTH PORT WASHINGTON AVENUE
MILWAUKEE, WISCONSIN 53212

SERIAL NUMBER: 11029911
FILING DATE: 01/05/2005
PATENT NUMBER:
ISSUE DATE:
TITLE: HANDS-FREE PERSONAL COMMUNICATION DEVICE

JEFFREY OLSEN, EXAMINER
ASSIGNMENT SERVICES BRANCH
PUBLIC RECORDS DIVISION

12-21-2005

Form PTO-1595 (Rev. 06/04)
OMB No. 0651-0027 (exp. 6/30/2005)

U.S. DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

12/19/05 RECOR

103141688

To the Director of the U.S. Patent and Trademark Office: Please record the attached documents or the new address(es) below.

**1. Name of conveying party(ies)/Execution Date(s):**

Christopher C. Gantz
Mandy M. Johnson
Allan G. Mlodzikowski

Execution Date(s): 11/29/05, 12/2/05, 12/2/05

Additional name(s) of conveying party(ies) attached? ☐ Yes ☑ No

**2. Name and address of receiving party(ies)**

Name: Koss Corporation
Internal Address:
Street Address: 4129 North Port Washington Avenue
City: Milwaukee
State: Wisconsin
Country: U.S.A. Zip: 53212

Additional name(s) & address(es) attached? ☐ Yes ☑ No

**3. Nature of conveyance:**

☑ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Government Interest Assignment
☐ Executive Order 9424, Confirmatory License
☐ Other

**4. Application or patent number(s):**

☐ This document is being filed together with a new application.

A. Patent Application No.(s)
11/029,911

B. Patent No.(s)

12/20/2005 BBYANE 00000031 11029911
01 FC:1806 40.00 OP

Additional numbers attached? ☐ Yes ☑ No

FINANCE SECTION DEC 8 PM 4:19

**5. Name and address to whom correspondence concerning document should be mailed:**

Name: Docket Clerk
Internal Address:
Street Address: P.O. Drawer 800889
City: Dallas
State: Texas Zip: 75380
Phone Number: 972-628-3600
Fax Number: 972-628-3616
Email Address:

**6. Total number of applications and patents involved:** 1

**7. Total fee (37 CFR 1.21(h) & 3.41)** $ 40.00

☐ Authorized to be charged by credit card
☑ Authorized to be charged to deposit account
☑ Enclosed
☐ None required (government interest not affecting title)

**8. Payment Information**

a. Credit Card Last 4 Numbers
Expiration Date

b. Deposit Account Number 50-0208

Authorized User Name William A. Munck

**9. Signature:**

Signature — Date: Dec. 12, 2005

William A. Munck, Reg. No. 39,308
Name of Person Signing

Total number of pages including cover sheet, attachments, and documents: 5

Documents to be recorded (including cover sheet) should be faxed to (703) 306-5995, or mailed to:
Mail Stop Assignment Recordation Services, Director of the USPTO, P.O.Box 1450, Alexandria, V.A. 22313-1450

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DOCKET NO.: KOSS01-00329 PATENT

# ASSIGNMENT

WHEREAS, We, Christopher C. Gantz, a citizen of the United States and resident of Northbrook, IL; Mandy M. Johnson, a citizen of the United States, and resident of Milwaukee, WI; and; Allan G. Mlodzikowski, a citizen of the United States, and resident of Muskego, WI have invented certain new and useful improvements in "HANDS-FREE PERSONAL COMMUNICATION DEVICE" disclosed in an application for United States Letters Patent (Application No. 11/029,911, filed January 5, 2005);

WHEREAS, KOSS CORPORATION, a corporation organized under the laws of Delaware, having a place of business at 4129 North Port Washington Avenue, Milwaukee, WI 53212 (hereinafter referred to as "ASSIGNEE"), is desirous of acquiring my entire right, title and interest in and to the invention, and in and to the said application and any Letters Patent that may issue thereon;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged; we do hereby sell, assign and transfer unto said ASSIGNEE, its successors, assigns and legal representatives, the full and exclusive right, title and interest in and to said invention and in and to said application and all patents which may be granted therefor, and all divisions, reissues, substitutions, continuations, continuations-in-part and extensions thereof; and I hereby authorize and request the Commissioner of Patents and Trademarks to issue all patents for said invention, or patents resulting therefrom, insofar as my interest is concerned, to the said ASSIGNEE of my entire right, title and interest.

I also hereby sell and assign to said ASSIGNEE, its successors, assigns and legal representatives the full and exclusive rights, title and interest to the invention disclosed in said application throughout the world, including the right to file applications and obtain patents, utility models, industrial models and designs for said invention in its own name throughout the world including all rights of priority, all rights to publish cautionary notices reserving ownership of said invention and all rights to register said invention in appropriate registries; and we further agree to execute any and all powers of attorney, applications, assignments, declarations, affidavits, and any other papers in connection therewith necessary to perfect such rights, title and interest in ASSIGNEE, its successors, assigns and legal representatives.

We hereby further agree that we will communicate to said ASSIGNEE, or to its successors, assigns and legal representatives, any facts known to us respecting any improvements; and, at the expense of said ASSIGNEE, to testify in any legal proceedings, sign all lawful papers, execute all divisional, continuation, continuation-in-part, reissue and substitute applications, and make all lawful oaths, and generally do everything possible to vest title in said ASSIGNEE and to aid said ASSIGNEE, its successors, assigns and legal representatives to obtain and enforce proper protection for said invention in all countries.

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IN WITNESS WHEREOF, we have hereunto set our hands and seal this _____ day of _____ 2005.

| First Inventor: | Witnesses: | |
|---|---|---|
| Christopher C. Gantz | Tracy Bureau (Signature of witness) | (Signature of witness) |
| 11-29-05 Date | Tracy Bureau (Printed name) | Sue Sachdeva (Printed name) |
| | Milwaukee, WI (Address) | Milwaukee, WI (Address) |

124 pt

Second Inventor:

Mandy M. Johnson

12-2-05
Date

Witnesses:

(Signature of witness)

Tracy Bruneau
(Printed name)

Milwaukee, WI
(Address)

(Signature of witness)

Sue Sachdeva
(Printed name)

Milwaukee, WI
(Address)

125 pp

Third Inventor:

Allan G. Mlodzikowski

12/2/05
Date

Witnesses:

(Signature of witness)

Tracy Brunear
(Printed name)

Milwaukee, WI
(Address)

(Signature of witness)

Sue Sachdeva
(Printed name)

Milwaukee, WI
(Address)

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# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* 4848-00331

**Box No. I TITLE OF INVENTION**

Hands-Free Personal Communication Device

**Box No. II APPLICANT** ☐ This person is also inventor

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

KOSS CORPORATION
4129 North Port Washington Avenue
Milwaukee, WI 53212-1052
United States of America

Telephone No.

Facsimile No.

Teleprinter No.

Applicant's registration No. with the Office

State *(that is, country)* of nationality: US

State *(that is, country)* of residence: US

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

GANTZ, Christopher C.
1320 Wendy Drive
Northbrook, IL 60062
United States of America

This person is:
☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality: US

State *(that is, country)* of residence: US

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

JOCHMAN, Joseph J.
ANDRUS, SCEALES, STARKE & SAWALL, LLP
100 East Wisconsin Avenue, Suite 1100
Milwaukee, WI 53202 USA

Telephone No. 414-271-7590

Facsimile No. 414-271-5770

Teleprinter No.

Agent's registration No. with the Office 25,058

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

127 129

**Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

*If none of the following sub-boxes is used, this sheet should not be included in the request.*

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

JOHNSON, Mandy M.
215 West Maple Street, Apt. 110
Milwaukee, WI 53204
United States of America

This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality: US

State *(that is, country)* of residence: US

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

MLODZIKOWSKI, Allen G.
S104 W21015 Cindy Drive
Muskego, WI 53150
United States of America

This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality: US

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:
- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:
- ☐ applicant only
- ☐ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

Applicant's registration No. with the Office

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

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**Supplemental Box** *If the Supplemental Box is not used, this sheet should not be included in the request.*

*1. If, in any of the Boxes, except Boxes Nos. VIII(i) to (v) for which a special continuation box is provided the space is insufficient to furnish all the information: in such case, write "Continuation of Box No...." (indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:*

*(i) If more than two persons are to be indicated as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;*

*(ii) If, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;*

*(iii) If, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;*

*(iv) If, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;*

*(v) If, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI.*

*2. If the applicant intends to make an indication of the wish that the international application be treated, in certain designated States, as an application for a patent of addition, certificate of addition, inventor's certificate of addition or utility certificate of addition: in such a case, write the name or two-letter code of each designated State concerned and the indication "patent of addition," "certificate of addition," "inventor's certificate of addition" or "utility certificate of addition," the number of the parent application or parent patent or other parent grant and the date of grant of the parent patent or other patent grant or the date of filing of the parent application (Rules 4.11(a)(iii) and 49bis.1(a) or (b)).*

*3. If the applicant intends to make an indication of the wish that the international application be treated, in the United States of America, as a continuation or continuation-in-part of an earlier application: in such a case, write "United States of America" or "US" and the indication "continuation" or "continuation-in-part" and the number and the filing date of the parent application (Rules 4.11(a)(iv) and 49bis.1(d)).*

(continuation of Box IV)

WOZNY, Thomas M., KUBORN, Joseph D., TAKEN, Michael E. JOCHMAN, Joseph J., FETTERLEY, Daniel D., ESSMANN, Gary A., SOLVESON, George H., SOKOL, Jeffrey S., FALK, William L., HOLSEN, Peter T., OLEJNICZAK, Aaron T., SCHERER, Christopher M. all of ANDRUS, SCEALES, STARKE & SAWALL, LLP, 100 East Wisconsin Avenue, Suite 1100, Milwaukee, WI 53202 US Phone: (414) 271-7590; Fax: (414) 271-5770

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**Box No. V DESIGNATIONS**

The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.

However,

☐ DE Germany is not designated for any kind of national protection

☐ KR Republic of Korea is not designated for any kind of national protection

☐ RU Russian Federation is not designated for any kind of national protection

*(The check-boxes above may be used to exclude (irrevocably) the designations concerned in order to avoid the ceasing of the eff, under the national law, of an earlier national application from which priority is claimed. See the Notes to Box No. V as to the consequences of such national law provisions in these and certain other States.)*

**Box No. VI PRIORITY CLAIM**

The priority of the following earlier application(s) is hereby claimed:

| Filing date of earlier application (day/month/year) | Number of earlier application | Where earlier application is: | | |
|---|---|---|---|---|
| | | national application: country or Member of WTO | regional application:* regional Office | international application: receiving Office |
| item (1) 09 January 2004 (09/01/2004) | 60/535,314 | US | | |
| item (2) 04 January 2005 (04/01/2005) | Non-provisional based on above | US | | |
| item (3) | | | | |

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purpose of this international application is the receiving Office)* identified above as:

☐ all items ☒ item (1) ☐ item (2) ☐ item (3) ☐ other, see Supplemental Box

* *Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(i)):* ....

.....

**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

**Choice of International Searching Authority (ISA)** *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used)*

ISA / EP .....

**Request to use results of earlier search; reference to that search** *(if an earlier search has been carried out by or requested from the International Searching Authority):*

Date *(day/month/year)* Number Country *(or regional Office)*

**Box No. VIII DECLARATIONS**

| The following declarations are contained in Boxes Nos. VIII (i) to (v) *(mark the applicable check-boxes below and indicate in the right column the number of each type of declaration)* | | Number of declarations |
|---|---|---|
| ☐ Box No. VIII (i) | Declaration as to the identity of the inventor : | |
| ☐ Box No. VIII (ii) | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent : | |
| ☐ Box No. VIII (iii) | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application : | |
| ☐ Box No. VIII (iv) | Declaration of inventorship (only for the purposes of the designation of the United States of America) : | |
| ☐ Box No. VIII (v) | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty : | |

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**Box No. IX CHECK LIST; LANGUAGE OF FILING**

This international application contains:

(a) in paper form, the following number of sheets:

| | | |
|---|---|---|
| request (including declaration sheets) | : | 5 |
| description (excluding sequence listing and/or tables related thereto) | : | 14 |
| claims | : | 33 |
| abstract | : | 1 |
| drawings | : | 8 |
| Sub-total number of sheets | : | 61 |
| sequence listing | : | |
| tables related thereto | : | |
| *(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (c) below)* | | |
| Total number of sheets | : | 61 |

(b) ☐ only in computer readable form (Section 801(a)(ii))
- (i) ☐ sequence listing
- (ii) ☐ tables related thereto

(c) ☐ also in computer readable form (Section 801(a)(ii))
- (i) ☐ sequence listing
- (ii) ☐ tables related thereto

Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the
- ☐ sequence listing: .....
- ☐ tables related thereto: .....

*(additional copies to be indicated under items 9(ii) and/or 10(ii), in right column)*

This international application is accompanied by the following item(s) *(mark the applicable check-boxes below and indicate in right column the number of each item)*: — Number of items

1. ☒ fee calculation sheet :
2. ☐ original separate power of attorney :
3. ☐ original general power of attorney :
4. ☐ copy of general power of attorney; reference number, if any: ..... :
5. ☐ statement explaining lack of signature :
6. ☐ priority document(s) identified in Box No. VI as item(s): ..... :
7. ☐ translation of international application into *(language)*: ..... :
8. ☐ separate indications concerning deposited microorganism or other biological material :
9. ☐ sequence listing in computer readable form *(indicate type and number of carrier(s))*
   - (i) ☐ copy submitted for the purposes of international search under Rule 13*ter* only (and not as part of the international application) :
   - (ii) ☐ *(only where check-box (b)(i) or (c)(i) is marked in left column)* additional copies (including, where applicable, the copy for the purposes of international search under Rule 13*ter* :
   - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listing mentioned in left column :
10. ☐ tables in computer readable form related to sequence listing *(indicate type and number of carrier(s))*
    - (i) ☐ copy submitted for the purposes of international search under Section 802(b-quater) only (and not as part of the international application) :
    - (ii) ☐ *(only where check-box (b)(ii) or (c)(ii) is marked in left column)* additional copies (including, where applicable, the copy for the purposes of international search under Section 802(b-quater) :
    - (iii) ☐ together with relevant statement as to the identity of the copy or copies with the tables mentioned in left column :
11. ☒ other *(specify)*: Postcard, check, letter of transmittal, Express Mail

Figure of the drawings which should accompany the abstract: 1

Language of filing of the international application: English

**Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE**

*Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).*

By: _____ (Signature)
Typed Name: Jill McCurdy
Capacity: Vice President (Title)
of Kose Corporation

**For receiving Office use only**

| | |
|---|---|
| 1. Date of actual receipt of the purported international application: | 2. Drawings: ☐ received: ☐ not received: |
| 3. Corrected date of actual receipt due to late but timely received papers or drawings completing the purported international application: | |
| 4. Date of timely receipt of the required corrections under PCT Article 11(2): | |
| 5. International Searching Authority (if two or more are competent): ISA / | 6. ☐ Transmittal of search copy delayed until search fee is paid |

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*This sheet is not part of and does not count as a sheet of the international application.*

# PCT

**FEE CALCULATION SHEET**
**Annex to the Request**

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International Application No.

Date stamp of the receiving Office

Applicant's or agent's file reference: 4848-00331

Applicant: Koss Corporation

**CALCULATION OF PRESCRIBED FEES**

| | | |
|---|---|---|
| 1. TRANSMITTAL FEE | 300 [T] | |
| 2. SEARCH FEE | 1920 [S] | |
| International search to be carried out by: EP | | |
| *(If two or more International Searching Authorities are competent to carry out the international search, indicate the name of the Authority which is chosen to carry out the international search.)* | | |
| 3. INTERNATIONAL FILING FEE | | |
| Where items (b) and/or (c) of Box No. IX apply, enter Sub-total number of sheets / Where items (b) and (c) of Box No. IX do not apply, enter Total number of sheets: 61 | | |
| [i1] first 30 sheets | 1134 [i1] | |
| [i2] 31 (number of sheets in excess of 30) x $12 (fee per sheet) = | 372.00 [i2] | |
| [i3] additional component (only if sequence listing and/or tables related thereto are filed in computer readable form under Section 801(a)(i), or both in that form and on paper, under Section 801(a)(ii)): | | |
| 400.00 x 0 (fee per sheet) = | 0.00 [i3] | |
| Add amounts entered at i1, i2 and i3 and enter total at I | 1,506.00 [I] | |
| *(Applicants from certain States are entitled to a reduction of 75% of the international filing fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the international filing fee.)* | | |
| 4. FEE FOR PRIORITY DOCUMENT *(if applicable)* | 40 [P] | |
| 5. TOTAL FEES PAYABLE | 3,766.00 TOTAL | |
| Add amounts entered at T, S, I and P and enter total in the TOTAL box | | |

**MODE OF PAYMENT**

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- ☐ postal money order
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**AUTHORIZATION TO CHARGE (OR CREDIT) DEPOSIT ACCOUNT**
*(This mode of payment may not be available at all receiving Offices)*

Receiving Office: RO/ US

Deposit Account No.: 01.2000

Date: 6 January 2005

Name: JOCHMAN, Joseph J.

Signature: Joseph J. Jochman

- ☐ Authorization to charge the total fees indicated above.
- ☒ *(This check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit)* Authorization to charge any deficiency or credit any overpayment in the total fees indicated above.
- ☒ Authorization to charge the fee for priority document.

# HANDS-FREE PERSONAL COMMUNICATION DEVICE

## FIELD OF THE INVENTION

[0001] The present invention relates to the field of hands-free personal communication devices. More specifically, the present invention relates to a hands-free personal communication device that is worn about a user's neck.

## BACKGROUND OF THE INVENTION

[0002] Hands-free personal communication devices are used in a variety of known professional and personal settings. In general, hands-free personal communication devices are useful for any application wherein it is desired to provide one-way or two-way communication while leaving the users' hands free to perform various other tasks. Hands-free personal communication devices are used by, for example, telephone operators and multimedia users who receive and/or send communications using the device and at the same time, use both hands for other tasks.

[0003] Headsets are a well-known example of hands-free personal communication devices. Headsets are typically worn on the user's head and have opposing speakers, one for each ear of the user, attached by a headband which extends over the top of the user's head. These devices may also include a boom which has one end attached to the headband and a second end that contains a microphone. The boom is often flexible and contains memory characteristic such that the boom is positionable into and out of various selectable positions.

[0004] A significant drawback to known headsets is that they are often uncomfortable to wear and can become entangled with or mess up the user's hair. Known headsets are also not as adjustable as is often desired and are typically rigid such that they do not fit a wide range of users having different body proportions. Because most headsets are arranged to be in constant contact with the user's ears and/or head, many users complain of head and/or ear discomfort.

[0005] U.S. Patent Application No. 10/218,277 by the present inventor Christopher Gantz, the disclosure of which is incorporated herein by reference, discloses a personal wearable communication and speaker system that is wearable about a user's neck. The communication and speaker system includes a gripping neckband attached to a speaker housing and an adjustable microphone support arm. The gripping neckband is rotatable about an axis by 180° to convert from a left-eared configuration to a right-eared configuration, and vice versa. A pad is attached to the distal end of the gripping neckband relative to the speaker housing. In a particular embodiment, the speaker housing can be disengaged from its base and automatically switched to a headphone mode wherein the speaker is mounted on the user's ear.

[0006] The above described patent application solves many of the above described problems with known headsets. However, further improvements upon this device are still desired. For example, it is desirable to provide an improved device that is more easily adjusted to fit a wide variety of body types and sizes. It is further desirable to provide a device that is more easily adjusted between headphone and ear phone use.

[0007] As such, it is desirable to provide an improved hands-free personal communication device that overcomes the shortcomings of known devices. It is desirable to provide a communication device that is self-supporting and adjustable to fit individuals having different body proportions. It is desirable to provide such a communication device that is easy to put on and take off. It is desirable to provide a hands-free communication device which is adjustable to fit either a left or right side of the user. It is desirable to provide such a device that eliminates head and ear discomfort often associated with many known headsets. It is further desirable to provide such a communication device that maintains or improves the acoustic output and input quality and performance of current known devices.

## SUMMARY OF THE INVENTION

[0008] The present invention is a hands-free personal communication device that overcomes many shortcomings of known devices.

[0009] The hands-free personal communication device includes an elongated elastic neckband which supports the communication device about the user's neck. The neckband has memory characteristic and is bendable along its length, or at least part of its length, such that the neckband is positionable into and out of various selectable positions. An acoustic output device is attached to the neckband and positioned near an ear of the user when the communication device is worn about the user's neck. A microphone is attached to a first end of an elastic boom attached to the neckband.

[0010] The hands-free personal communication device may also include an earphone or earbud attached, for example, to the second end of the neckband. The earphone is detachable from the neckband such that the earphone is insertable into an ear of the user when the communication device is worn about the user's neck. An electrical connection provides communication to and from the earphone and microphone.

[0011] The hands-free personal communication device of the present invention may be easily adjusted and fitted so as to be worn comfortably and in firm and stable fashion around the neck, just at or above the shoulders, of a user. It has the advantage of not being in direct contact with the more sensitive areas of the body, such as the ear and head or scalp. The present invention

includes an ergonomic alternative to a traditional headset or earset. The device of the present invention places a speaker and microphone combination on or near the intersection of the user's neck and shoulder, thereby eliminating the need for any sort of contact with or mounting to the user's head or ear. The freedom of movement and rotation provided by the elastic and memory characteristics of the neckband provide significant advantages where mobility, stability and comfortable fit are desired.

[0012] Furthermore, one embodiment of the present invention allows the user to place a detachable earbud in the user's ear, if desired. By this arrangement, the user can easily disengage the earbud from the elastic neckband and insert it into the user's ear for more private conversations. In addition, the hands-free personal communication device can include a switch and/or a control module to change the output of the device from loudspeaker mode to headphone mode in order to eliminate the need to control the volume when the user temporarily (for momentary privacy concerns, for example) places the earbud into the user's ear. The switch may be manual or the device may be configured to automatically switch to headphone mode when the earbud is utilized.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The drawings illustrate the best mode presently contemplated of carrying out the invention.

[0014] In the drawings:

[0015] Fig. 1 is a perspective view of the hands-free personal communication device worn about a user's neck;

[0016] Fig. 2 is a top view of a first embodiment of the hands-free personal communication device;

[0017] Fig. 3 is a top view of the hands-free personal communication device shown in Fig. 2, wherein the earbud is removed;

[0018] Fig. 4 is a top view of the device, depicting the memory characteristic and bendability of the elongated elastic neckband;

[0019] Fig. 5 is a side view of the hands-free personal communication device;

[0020] Fig. 6 is a detailed view of the control module;

[0021] Fig. 7 is a detailed sectional side view of the hands-free personal communication device;

[0022] Fig. 8 is a sectional top view of the audio component;

[0023] Fig. 9 is a top view of an alternate embodiment of the hands-free personal communication device;

[0024] Fig. 10 is a perspective view of an alternate embodiment of the hands-free personal communication device worn about a user's neck; and

[0025] Fig. 11 is a top view of an alternate embodiment of the hands-free personal communication device.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] In the preferred embodiments of the present invention described in detail below, a hands-free personal communication device is provided. It should be understood that the drawings and specification are to be considered an exemplification of the principles of the invention, which is more particularly defined in the appended claims.

[0027] Referring to Figs. 1 and 2, a preferred embodiment of the hands-free personal communication device is shown. A neckset 15 includes an elongated elastic neckband 17 for supporting the neckset 15 about a user's neck. The elastic neckband 17 is bendable and/or twistable along at least part of its length and has memory characteristic such that when the neckband 17 is moved into a certain position it retains that position. In this manner, the shape and position of the neckband 17 can be changed such that it comfortably fits around a user's neck. This also allows the various audio components carried by the neckband 17 (which are described in more detail below) to be positioned in a location where they will not interfere with, for example, a user's chin or mouth. As shown in Fig. 1, the neckband 17 is worn around the user's neck 16 and rests on either the user's shoulders 14, or on the area where the shoulders 14 meet the neck 16. Because the neckband 17 is bendable and/or twistable along its length and has memory characteristics, it can be shaped to properly fit around the user's individual physique such that it has stability and is comfortable to wear.

[0028] Referring now to Figs. 1, 2, 7 and 8, in a particular embodiment, the elastic neckband 17 includes a bendable wire 20 or metal tube and a flexible rubber coating 22, preferably comprising a thermo plastic elastomer. However, it should be recognized that the elastic neckband 17 may comprise any one of a variety of known materials that are flexible and have memory characteristics such that the neckband 17 is positionable into and out of a variety of positions along its entire length, or alternately along a portion thereof.

[0029] An acoustic output device or speaker 19 is integrally attached to the elastic neckband 17 and resides within a speaker housing 31. The speaker 19 receives audio and electrical input from speaker audio/power cord 21 and may comprise any one of a variety of audio speakers known in the art. The speaker 19 however should be capable of providing sufficient audio output such that a user may hear the audio output when the neckset 15 is worn about the

user's neck and the speaker housing is resting on the user's shoulder, as will be described further below, and as is shown in Fig. 1. The audio output of the speaker 19 is controllable by a volume control, which in the embodiment shown is a rotary member 18.

[0030] Referring to Figs. 1 and 2, a speaker screen 30 covers the speaker 19 and protects the speaker 19 from damage. Speaker screen 30 is preferably made of metal and includes a series of holes 28 which allow audio from the speaker 19 to pass through the speaker screen 30.

[0031] Audio/power cord 21 provides audio and electrical signals to the neckset 15 and includes a 2.5 millimeter plug that is connected to the speaker housing 31 by a strain relief (not shown). Strain relief provides strength and durability to the connection and is preferably formed of a notched cone-shaped rubber piece that provides a flexible and durable connection. It will also be recognized by those skilled in the art that the neckband 17 may include a wireless transmitter instead of the audio/power cord 21. Such an arrangement would also include a separate power source, such as for example a battery, for powering the various audio components provided with the device.

[0032] As shown in Figs. 1, 2 and 7, the neckset 15 further includes a bendable boom arm 23 having a microphone 25 attached to its distal end 27 relative to the speaker 19. The bendable boom arm 23 is preferably constructed of bendable material such as wire, a flexible memory plastic, or metal tube 20 and a flexible rubber coating 22, preferably including a thermal plastic polymer. The boom arm 23 is positionable into and out of a variety of positions along its entire length, or a portion thereof. The microphone 25 is attached to the end of the boom arm 23 and consists of any one of a variety of known microphones for receiving sound from an external source. The microphone 25 is encased by a foam covering 26 to protect the microphone 25 from wind noise and yet still allow for audio pickup. The boom arm 23 is thus positionable such that it can be easily moved to various positions and will stay where it is moved. This allows the microphone 25 to be positioned in a location where it will not interfere with the user's mouth or chin, and yet allows the microphone 25 to be moved close to the user when the user wants to speak softly and still be heard.

[0033] Referring now to Figs. 3 and 7, the illustrated embodiment of the neckset 15 includes a detachable earphone, which is often referred to in the art as an earbud 47. The earbud 47 is releaseably attached to the distal end 49 of the elastic neckband 17. The earbud 47 is detachable from the elastic neckband 17 and yet remains connected to the elastic neckband 17 by a retractable power/audio cord 51. According to this arrangement, the earbud 47 is easily removed from the elastic neckband 17 and reattached to the elastic neckband 17. In the embodiment shown, retractable power/audio cord 51 resides within an open-faced cavity 54.

[0034] The earbud 47 and neckset 15 may alternately include wireless transmitters and the earbud 47 may include a power source. In such an arrangement, the power/audio cord 51 would not be necessary, as the earbud 47 would be capable of wirelessly transmitting with the neckset 15. The earbud 47 provides many advantages that will be recognized by one skilled in the art. The earbud 47 provides privacy to one using the neckset 15. The earbud 47 also increases the ability of the user to hear the audio output as compared to the speaker 19. This is particularly true if the neckset 15 is used in a crowded and/or noisy environment.

[0035] Referring to Fig. 7, the distal end 49 of the elastic neckband 17 defines an open-ended cavity 54 for releaseably receiving and retaining the earbud 47. According to this arrangement, the side portions 44 of the open-ended cavity 54 are flexible such that the earbud 47 is easily inserted into and removed from the cavity 54 on the elastic neckband 17. In the embodiment shown, the earbud 47 has an outwardly protruding collar 48 that is sized and shaped to be received in a snap-fit arrangement by an annular groove 52 on the interior of the cavity 54, to thereby securely and releasably retain the earbud 47 in the cavity 54. Various other releasable connections may be employed, such as for example an arrangement where the earbud 47 is sized and shaped to be press-fit into the cavity 54.

[0036] In the embodiment shown, retractable power/audio cord 51 resides within the open-ended cavity 54, in such a manner that easy retraction and deployment of the power/audio cord 51 and earbud 47 are possible. In Fig. 7, the power/audio cord is shown in its retracted state as the earbud 47 is nested in the open-ended cavity 54. The power/audio cord 51 is attached to the earbud 47 by a strain relief 53, which provides strength and durability to the connection and is preferably formed of a notched cone-shaped rubber piece and provides a flexible and durable connection.

[0037] In use, the earbud 47 is detached from the neckset 15 and inserted into a user's ear, thus providing audio to the user. Removal of the earbud 47 from the neckset 15 may automatically cause the speaker 19 to stop producing audio, or alternatively, the earbud 47 and speaker 19 may be controlled by a control module 41 (shown in Fig. 6). The control module 41 is arranged to control the volume of speaker 19. More specifically, the control module 41 includes volume control, which, in the embodiment shown, is a manually operable rolling member 43. In addition, the control module 41 may include an on/off switch 45 for selectively providing electrical power to the neckset 15, including the speaker 19 and microphone 25. The control module 41 preferably further includes an amplifier (not shown) for electrically driving the audio input to speaker 19 and from microphone 25. The module 41 may further include means from providing power to the neckset 15, such as for example a battery.

[0038] Referring to Fig. 4, the neckset 15 is adjustable such that the speaker 19 may be positioned on either a left or right ear of the user. As shown by arrow 35, the elastic neckband 17 is adjustable 180 degrees about axis 36 such that the left 37 and right 39 configurations are possible. In addition to the configurations shown, the elastic neckband 17 is positionable such that the neckband 17 is sized to fit the individual user's physique. For example, if the user's neck is wide, the neckband 17 is positioned such that the speaker 19 and earbud 47 are further apart.

[0039] Referring to Fig. 5, the a side view of the neckset 15 is shown.

[0040] The elastic neckband 17 may be provided with a neck brace 56 which can include a curved piece of flexible or stiff rubber (see Fig. 9) or plastic or soft foam sleeve (see Fig. 11). The neck brace 56 provides additional stability and form to the neckband 17 and assists the neckband 17 to fit properly around the user's neck.

[0041] Referring to Fig. 9, an additional embodiment of the neckset 15 includes an open-faced cavity 57, which is open along the distal end 49 of the neckband 17. The open-faced cavity 57 advantageously allows the power/audio cord 51 to extend in a direction transverse to the distal end 49 of the elongated neckband 17 when the earbud 47 is inserted in the user's ear.

[0042] In the particular arrangement shown in Fig. 9, the earbud 47 includes an elongated tapered member 59 that is sized slightly smaller than the width of the open-faced cavity 54. In this arrangement, the elongated tapered member 59 is press-fit into the open-faced cavity 54 to releaseably secure the earbud 47 to the distal end 49 of the neckband 17.

[0043] Referring to Fig. 10, it is further recognized that the distal end 49 of the neckband 17 may include an additional fixed speaker 55 in addition to or rather than the earbud 47. In such an arrangement, speakers 19, 55 are disposed on either side of the user's head and provide binaural sound to the user.

[0044] Referring to Fig. 11, an arrangement is shown wherein the distal end 49 of the neckband 17 includes a closed-ended open-faced cavity 61. In this arrangement, the earbud 47 is sized and shaped to fit within the closed-ended open-faced cavity 61 in a press fit manner, to releaseably attach the earbud 47 to the distal end 49 of the neckband 17.

[0045] It is recognized that the neckset 15 is useable in a variety of environments. As such, the speakers 19, 55, the earbud 47, and the microphone 25 may be designed such that they are waterproof. Referring briefly to Fig. 7, water repellant paper (not shown) may be provided on the microphone 25 to protect the microphone 25 from damage caused by moisture or water. In addition, the speaker housing 31 may include water repellant paper (not shown) which is preferably positioned on the top and bottom of the speaker 19 and/or inside the speaker screen 30

and the lower portion of the speaker housing 31. The water repellant paper prevents water from entering the speaker housing 31 and damaging the speaker 19.

[0046] It is also recognized that an embodiment of the neckset 15 may not include the earbud 47. In such an arrangement, the distal end 49 of the neckband 17 would form a weighted bud which offsets the weight of the speaker 19, boom arm 23 and microphone 25 when the neckset 15 is worn about the user's neck.

[0047] While this invention is susceptible to embodiments in many different forms, the drawings and specification describe in detail a preferred embodiment of the invention. They are not intended to limit the broad aspects of the invention to the embodiment illustrated.

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## CLAIMS

What is claimed is:

1. A hands-free personal communication device for wearing about a user's neck, the communication device comprising:

an elongated elastic neckband for supporting the communication device about the user's neck, the neckband having memory characteristic and being bendable along its length such that the neckband is formable into and out of various selectable positions;

an acoustic output device attached to the neckband and positionable near an ear of the user when the communication device is worn about the user's neck; and

a microphone attached to a first end of the neckband.

2. The hands-free personal communication device of claim 1, further comprising an earphone attached to a second end of the neckband, the earphone being detachable from the neckband such that the earphone is insertable into an ear of the user when the communication device is worn about the user's neck.

3. The hands-free personal communications device of claim 2, further comprising an electrical connection between the earphone and the communication device.

4. The hands-free personal communication device of claim 1, further comprising a battery.

5. The hands-free personal communication device of claim 1, further comprising a wired electrical connection.

6. The hands-free personal communication device of claim 1, further comprising a wireless electrical connection.

7. The hands-free personal communication device of claim 1, further comprising an earphone attached to a second end of the neckband.

8. The hands-free personal communication device of claim 7, wherein the earphone is detachable from the neckband and insertable into an ear of the user when the communication device is worn about the user's neck.

9. The hands-free personal communication device of claim 1, wherein the elastic neckband comprises a bendable wire and a flexible rubber coating.

10. The hands-free personal communication device of claim 1, further comprising a weighted boom attached to a second end of the neckband, the weighted boom of sufficient weight to offset the acoustic output device and microphone when the device is worn about the user's neck.

11. The hands-free personal communication device of claim 1, further comprising means for controlling the volume of the acoustic output device.

12. The hands-free personal communication device of claim 1, wherein the acoustic output device comprises an audio speaker.

13. The hands-free personal communication device of claim 8, wherein the neckband comprises a cavity that facilitates retraction and deployment of an electrical wire connected to the earphone.

14. The hands-free personal communication device of claim 1, further comprising a second acoustic output device attached to the neckband and positionable near another ear of the user.

15. The hands-free personal communication device of claim 1, further comprising a neck brace attached to the neckband to provide additional stability to the neckband.

16. The hands-free personal communication device of claim 1, wherein the acoustic output device is waterproof.

17. The hands-free personal communication device of claim 1, wherein the microphone is waterproof.

18. A hands-free personal communication device for wearing about a user's neck, the communication device comprising:

an elongated elastic neckband for supporting the communication device about the user's neck;

an acoustic output device attached to the elongated elastic neckband and positionable near an ear of the user when the communication device is worn about the user's neck; and

an earphone attached to an end of the neckband, the earphone being detachable from the neckband and insertable into an ear of the user when the communication device is worn about the user's neck.

19. The hands-free personal communication device of claim 4 wherein the earphone is removably attached to the communication device by an electrical cord having memory characteristic.

20. The hands-free personal communication device of claim 18, further comprising an electrical connection between the earphone and the communication device.

21. The hands-free personal communication device of claim 18, further comprising a battery.

22. The hands-free personal communication device of claim 18, further comprising a wired electrical connection.

23. The hands-free personal communication device of claim 18, further comprising a wireless electrical connection.

24. The hands-free personal communication device of claim 18, wherein the elastic neckband comprises a bendable wire and a flexible rubber coating.

25. The hands-free personal communication device of claim 18, further comprising a weighted boom attached to a second end of the neckband, the weighted boom of sufficient weight to offset the acoustic output device and microphone when the device is worn about the user's neck.

26. The hands-free personal communication device of claim 18, further comprising means for controlling the volume of the acoustic output device.

27. The hands-free personal communication device of claim 18, wherein the acoustic output device comprises an audio speaker.

28. The hands-free personal communication device of claim 18, wherein the neckband comprises a cavity that facilitates retraction and deployment of an electrical wire connected to the earphone.

29. The hands-free personal communication device of claim 18, further comprising a second acoustic output device attached to the neckband and positionable near another ear of the user.

30. The hands-free personal communication device of claim 1, further comprising a neck brace attached to the neckband to provide additional stability to the neckband.

31. The hands-free personal communication device of claim 18, wherein the acoustic output device is waterproof.

32. The hands-free communication device of claim 18, wherein the microphone is waterproof.

33. A hands-free personal communication device for wearing about a user's neck, the communication device comprising:

an elongated neckband for supporting the communication device about the user's neck, the neckband having memory characteristic and being bendable along its length such that the neckband is formable into and out of various selectable positions;

an acoustic output device attached to the neckband and positionable near an ear of the user when the communication device is worn about the user's neck;

a microphone attached to a first end of the neckband;

an earphone attached to an end of the neckband, the earphone being detachable from the neckband and insertable into an ear of the user when the communication device is worn about the user's neck; and

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a neck brace attached to the neckband to provide additional stability to the neckband. 144

HANDS-FREE PERSONAL COMMUNICATION DEVICE

## ABSTRACT OF THE INVENTION

A hands-free personal communication device is worn about a user's neck. The communication device includes an elongated elastic neckband for supporting the communication device about the user's neck. The elastic neckband has memory characteristic and is bendable along its length such that the neckband is formable into and out of various selectable positions. An acoustic output device is attached to the neckband and positioned near an ear of the user when the communication device is worn about the user's neck. A microphone is attached to an end of the neckband. A detachable earbud may be attached to an end of the neckband.

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FIG. 1

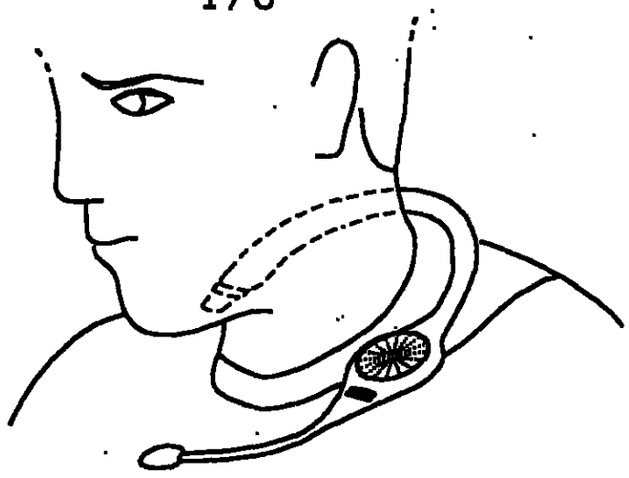
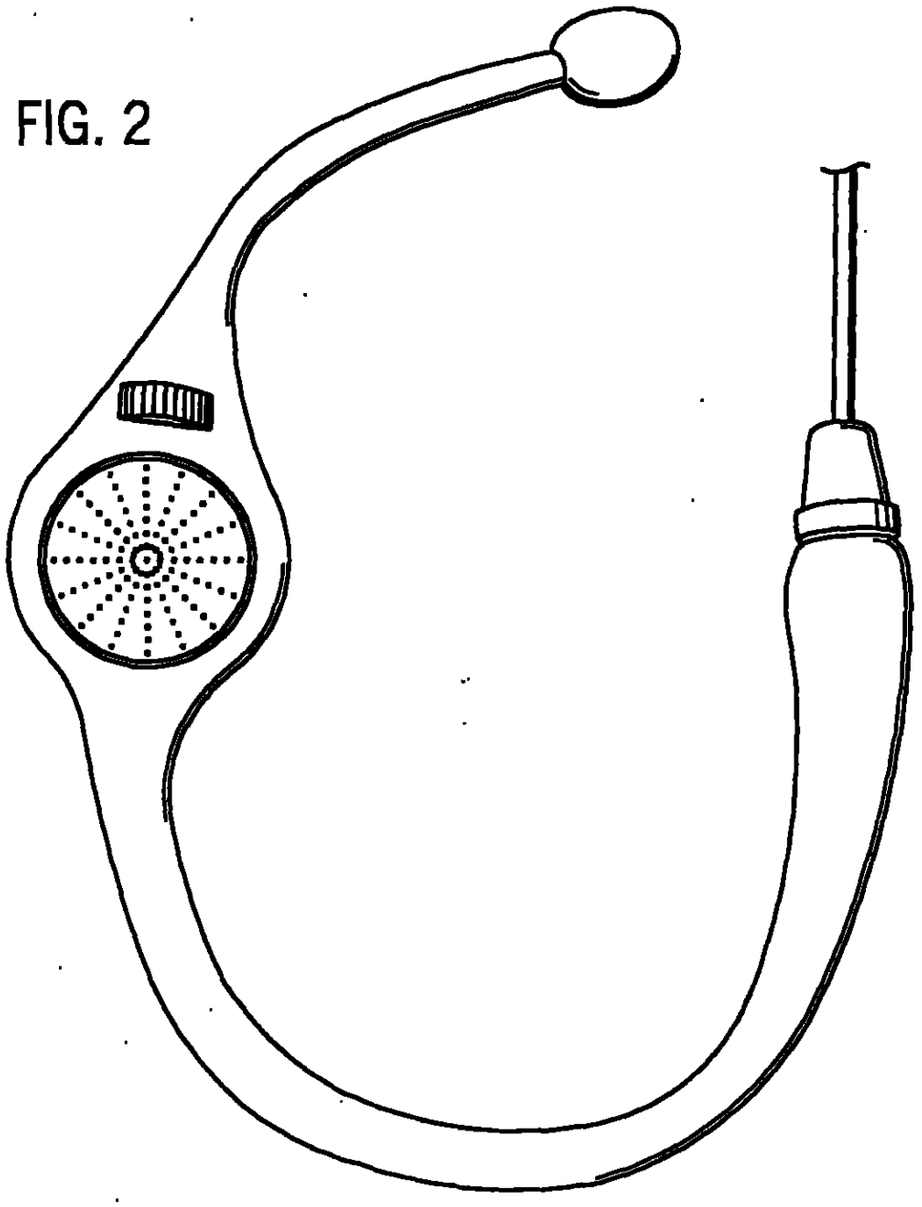


FIG. 2



~~149~~ 147

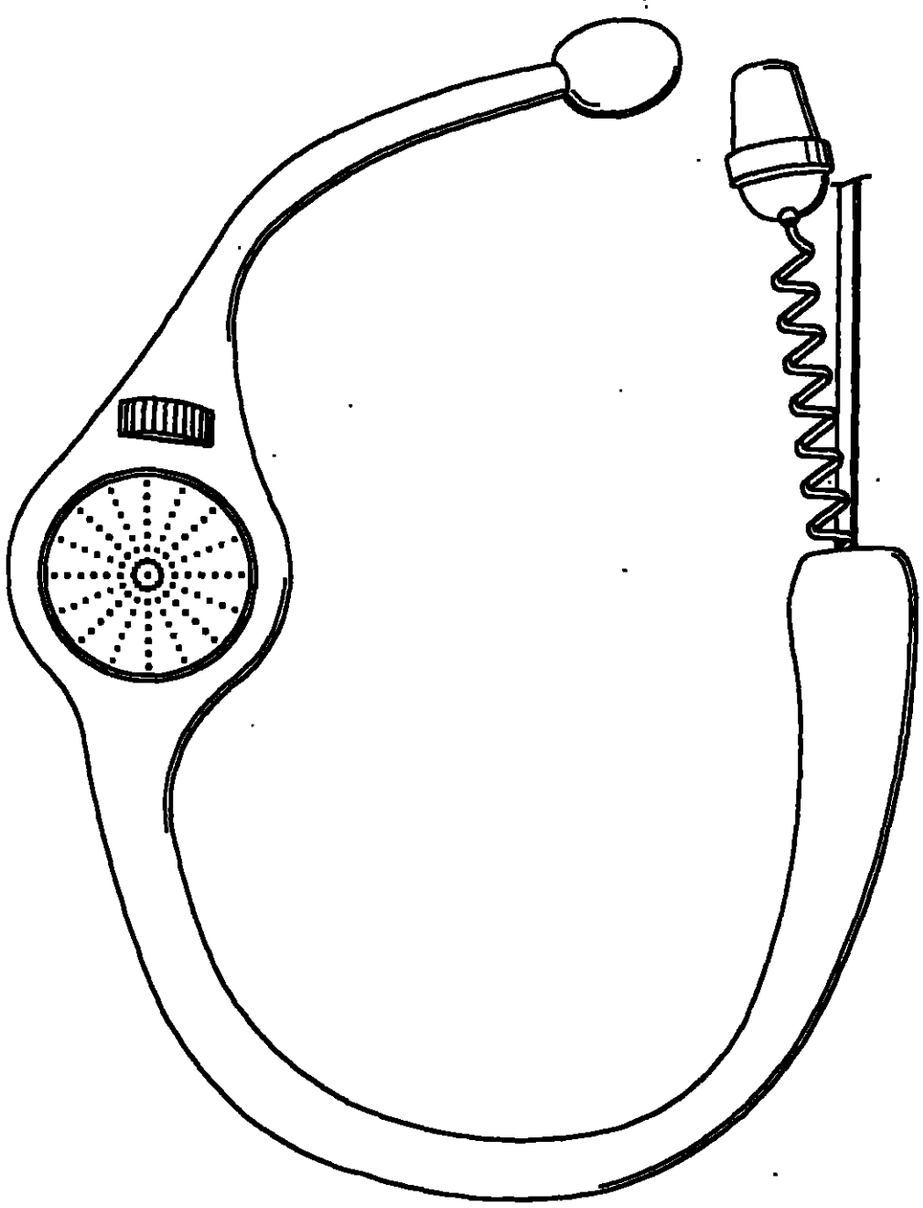


FIG. 3

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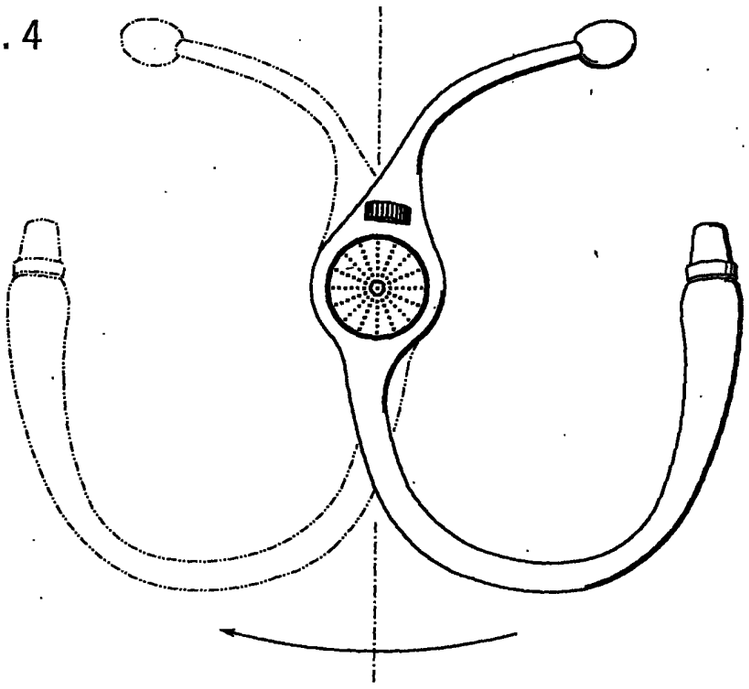
FIG. 4



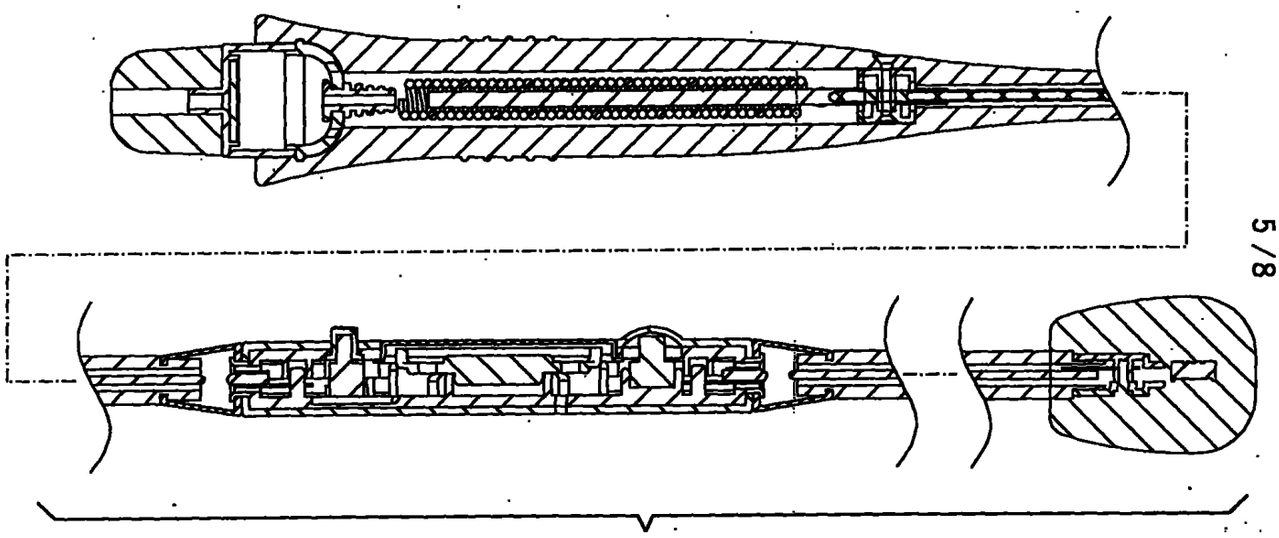




FIG. 7

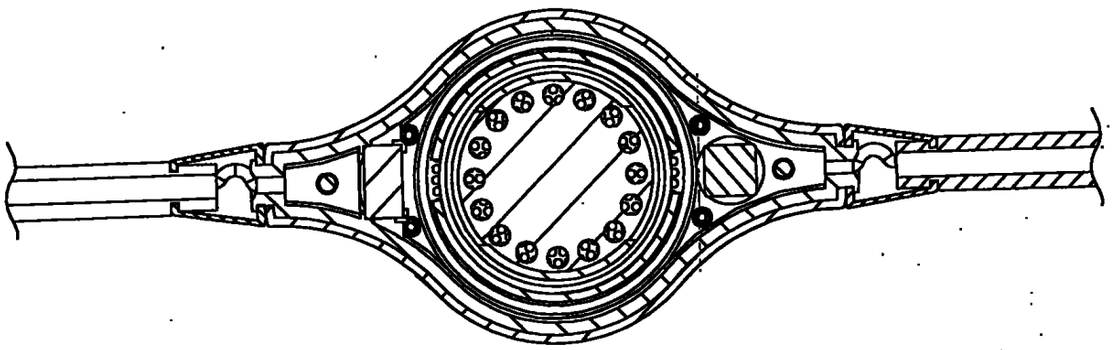




FIG. 8

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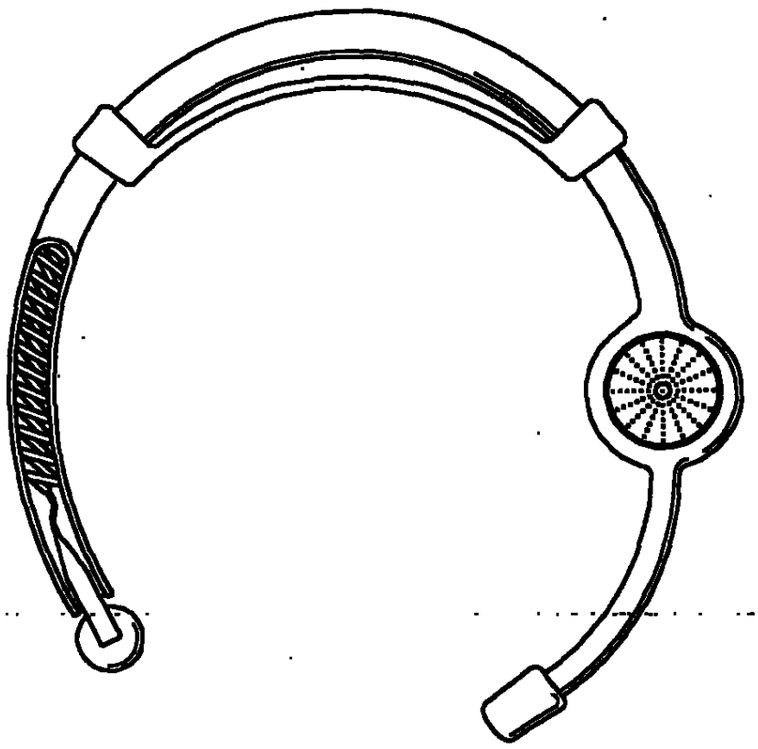
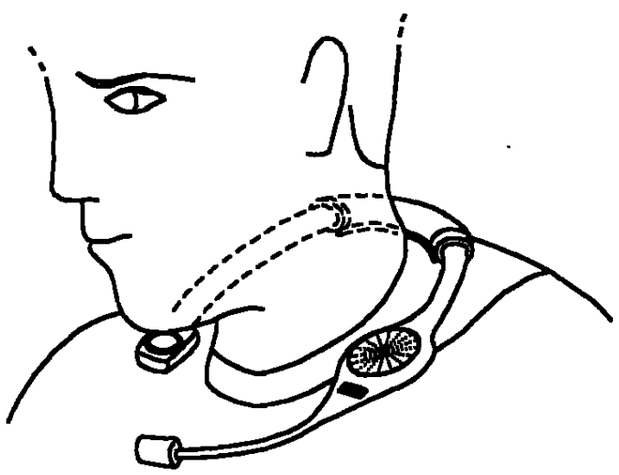


FIG. 9

FIG. 10



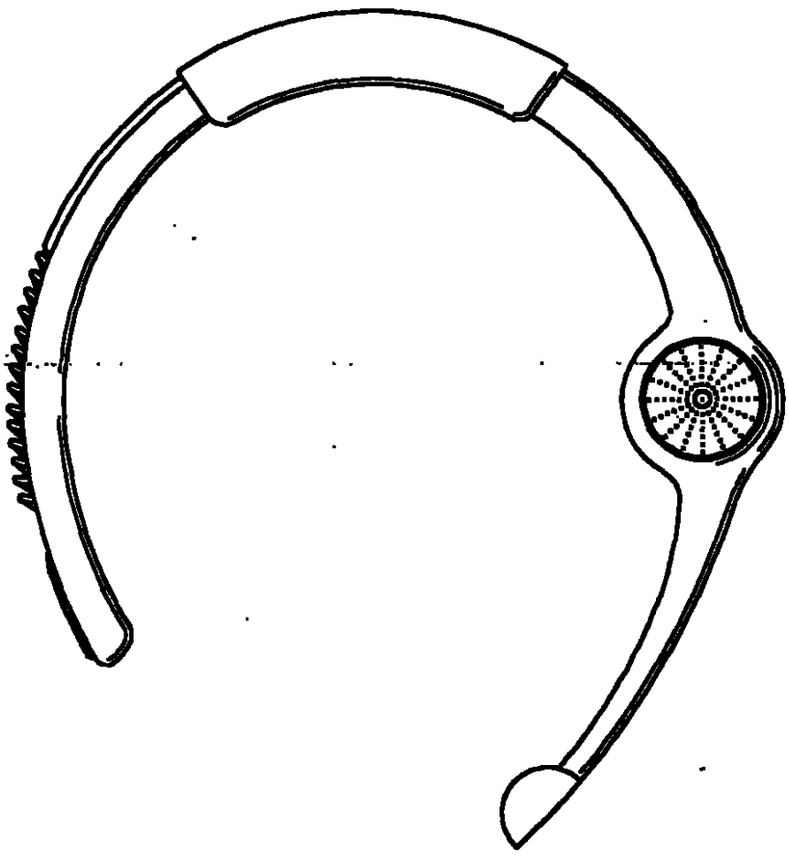


FIG. 11

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# REQUISITOS MINIMOS PARA ADMISION A TRAMITE
## PCT

PATENTE DE INVENCION [ ] MODELO DE UTILIDAD [ ]

- Indicación de que se solicita la concesión de una patente [ ]
- Datos de identificación del solicitante o de la persona que presenta la solicitud [ ]
- Descripción de la invención [ ]
- Dibujos de ser estos pertinentes [ ]
- Comprobante de pago de las tasas establecidas [ ]

COMPLETA [ ] INCOMPLETA [ ]

DISEÑO INDUSTRIAL [ ]

- Indicación de que se solicita el registro de Diseño Industrial [ ]
- Datos de identificación del solicitante o de la persona que presenta la solicitud [ ]
- Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño [ ]
- Comprobante de pago de las tasas establecidas [ ]

COMPLETA [ ] INCOMPLETA [ ]

ESQUEMA DE TRAZADO [ ]

- Indicación de que se solicita el registro de un Esquema de Trazado [ ]
- Datos de identificación del solicitante o de la persona que presenta la solicitud [ ]
- Representación gráfica del esquema trazado [ ]
- Comprobante de pago de las tasas establecidas [ ]

COMPLETA [ ] INCOMPLETA [ ]

Fdo B

Firma Responsable

Fecha 11-07-06

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**REPUBLICA DE COLOMBIA**

**SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO**

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Bogotá,
2020

Doctor(a)
CADENA SARMIENTO JUAN PABLO

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|---|---|---|
| REFERENCIA | Radicación No. | 6 66967 |
| | Solicitud internacional | US2005/000297 |
| | Fecha inicio fase nacional | 09/08/2006 |
| | Trámite | 11 |
| | Evento | 378 |
| | Actuación | 430 |
| | Oficio No. | 10461 |

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486.

2. La solicitud no contiene el poder debidamente otorgado, con el lleno de los requisitos exigidos por los artículos 63 y subsiguientes del Código de Procedimiento Civil. Adicionalmente, deberá presentar el documento que acredita la existencia y representación legal de la sociedad solicitante, cuando ésta fuere persona jurídica.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Unica No.10 de 2001.

ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de fecha 15 SET. 2006
adpall