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(54) **Device for amelioration of the quality of hearing**

(57) This is referred to patients with partial or total loss of hearing of the one ear and somehow good or excellent condition of the other ear.

The essential difference from the ordinary dullness earphones of optic glasses type, or any other type or system, is the addition of a second microphone in the altitude of the ear with necrosis.

By the use of this device the patient may perceive low intensity sounds even whistles as well as the sound of a telephone earphone from the side and close to the ear with necrosis.

This device consists of:

1. Microphone: mini condensing microphone (ordinary)
2. Pre-amplifier of acoustic frequencies (ordinary)
3. Earphone: (or sound vibrations system for incitement through the cranial bones, of the acoustic nerve), for the healthy ear (ordinary).
4. Batteries and switch on-off (ordinary)
5. Adjuster for voice volume (ordinary).

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Description

[0001] The invention is a device for the amelioration of the quality of hearing for patients with hearing problems and especially with sensible difference of hearing capacity of both ears, that is with perfect or large deafness of the one ear and with a medium or excellent condition of the other. This is obtained by the mutual aid, - (external and electronic) - of both ears. That means a microphone conceives the sounds from the side of the bad ear and carries them electronically magnified to the earphone to the side of the good ear.

[0002] The systems operated up today - (manufacturers), enter upon the solution in site of each ear problem - (with the up today known earphones for dullness of any kind)-, without giving the possibility of the external mutual reaction of the one - (good), with the other - (with necrosis), ear.

[0003] By this possibility the patient conceives the sounds, mainly in surrounding space with big burden of sounds, by a microphone from the side of the bad ear and in sequence carries them magnified to the other good ear, that means he may hear whispers or the sound of a telephone earphone, usually sounds of low intention close to the ear and from the side from which it was not possible to hear with the usual earphones for dullness of any kind.

[0004] A device in this case is reported this of the system with special frames - (optic glasses) -, more massive of the ordinary ones in order to be incorporated in this frame the components of the device in cause. This device may be applied in any known system of dullness earphones and also with wireless communication of both ears, as well as in a system tele-operated with a microcomputer for a lot of uses of sickness etc.

[0005] The components of the special optic glasses are the following:

1. Mini condensing microphone like the one existing in the common dullness earphones. This is placed inside the frame by the one side and in the height of the supposed ear with necrosis. This is connected by wires with the rest of the components of the device. It may also be connected in parallel (electrically) with another microphone too of the same characteristics in the side of the supposed good ear and if there is a reason for this, that is if there is a dullness problem in this ear too. The addition of the second microphone is the more essential difference from the ordinary dullness earphones of any type. This microphone substitutes the ear with necrosis.
2. Pre-amplifier of acoustic frequencies. This consists of micro-circuits similar to those ones of the usual dullness earphones. In the inlet of the pre-amplifier are connected the said two microphones and in the outlet is connected the earphone or the system of sound vibrations if the acoustic nerve of the somehow good ear is healthy, as stated below.

3. Earphone. This is connected in the outlet of the pre-amplifier with a fiche and wire in order to be inserted in the healthy ear (just likely to the common dullness earphones). In the place of earphone may be connected the known system of sound vibrations in order to be incited through the cranial bones, the acoustic nerve in the somehow good ear. The earphone may be also folding to the frame and in the altitude of the relatively good ear.

4. Batteries: ordinary, placed inside the frame of the optic glasses in order to supply with electric current the device. In this case of the wired glasses may be necessary just one battery only. In other case of the wireless communication of the two ears, as stated below, it is needed a second battery too for the supply of the transmitter with which will be connected the microphone in order to substitute the bad ear, placed so in the corresponding side of the leg of the said frame of the wireless now glasses.

5. Switch on-off: ordinary. This disconnects and restores the electric current in the device.

6. Wires: they go through the frame from the one end to the other and this because they must be connected by wires both ears even through the frames of the lens - (or simple crystals in case that the patient has no sight problem too). Certainly, it is possible for both relative legs of the frame by a wire out of the frame strengthened just like a string in order that the glasses may hung round the neck of the patient when he does not use them.

The wires are needed also for the connection of the component parts of the device.

The wires connecting the two legs of the frame may be replaced with a receiver and transmitter of radio frequencies - (wireless communication), those placed also in the corresponding leg of the glasses frame, that is by use of microphone transmitter as also of a battery placed in the leg corresponding to the destroyed ear, and also a receiver with vibrator or earphones - (it depends on the case of healthy or not acoustic nerve proportionally),- in the somehow good ear,-(relative leg).

Additionally, the construction and the wires of the said device may permit the transposition of the two legs of the frame of optic glasses with wireless or not communication, and this for the selection by switch, it depends on the sickness each time of each ear, by the patients.

7. Volume adjuster. This adjusts the sound intensity in the outlet of the pre-amplifier (electronically). Using this additional connection in the device with the additional microphone and the rest of the components, the patient regains full acoustic touch with the surrounding space, with any sound particularities of this space and proportionally to the conditions of life way of the patient.

We have to state some spaces with extra sound charge with sound particularities as: theaters, cine-

mas, taverns, assemblies rooms, congress hall, work spaces etc. In which the patient acquires full acoustic touch with the surrounding space each time.

claims 1 - 4, characterized furthermore by the general use of transmitter receiver placed at each ear and in the acoustic pore of each ear with the other components of this device and with the extra microphone.

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Claims

1. Device for the amelioration of the quality of hearing for patients with hearing problems characterized by the extra addition of a microphone on the up today known systems of dullness earphones of any type and which microphone substitutes the supposed ear with necrosis of the patient, the other ear supposed healthy receives electronically the sounds conceived by the said microphone and with the known system of sound vibrations, in order to incite the acoustic nerve of the healthy ear through the cranial bones. 10 15
2. Device for the amelioration of the quality of hearing for patients with hearing problems according to the claim 1, characterized furthermore by the fact that in the frame of the ordinary special optic glasses more massive than the common legs, are placed wires, microphones, earphones, microcircuits, switch ON-OFF, batteries, volume adjuster, and in which device the only difference from the known common ones of this type, dullness earphones is the addition of a microphone inside the leg of the frame and from the side of the supposed ear with necrosis and in its altitude. 20 25 30
3. Device for the amelioration of the quality of hearing for patients with hearing problems according to the claim 1, characterized furthermore by the fact that the extra added microphone in the ordinary dullness earphones of optic glasses type, is connected by wires with the rest of device of the other leg of the frame through the frames of the lens, or externally by a wire strengthened just like a string for the support of the said glasses round the neck of the patient. 35 40
4. Device for the amelioration of the quality of hearing for patients with hearing problems according to the claim 1, characterized furthermore by the use of wireless communication of both ears and with a transmitter - (radio frequencies) - and microphone with an independent mini battery, as well as a receiver with earphone or a sound vibrations system for the good ear, all those placed in the corresponding legs of the frame of this device of the dullness earphones type optic glasses, or any other system for the wireless communication of both ears. 45 50 55
5. Device for the amelioration of the quality of hearing for patients with hearing problems according to the