

HANGING-TYPE EARPHONE

TECHNICAL FIELD

The present invention relates to a hanging-type earphone, and more specifically, to a technique for a hanging-type earphone which allows the supporting position of an ear hanger hung along the base of a pinna to be freely changed.

BACKGROUND ART

Generally, conventional headphones have a pair of housings which have headphone units corresponding to a left channel and a right channel. The housings are usually attached to both ends of a headband almost shaped like letter U.

The headphones include open-air type and enclosed type in which a pinna is entirely covered with a housing. In addition, the headphones include so-called inner-ear type which is inserted into the external ear canal of a pinna such that a housing is held by a tragus and an antitragus.

Incidentally, pinnas where housings are placed vary in shape and size among individuals, and thus particularly housings of inner ear type are tend to vary in fit during use among individuals. To be specific, in the case of a person having a small pinna, a housing inserted into an external ear canal may press the pinna and cause pain or a pressure mark. On the other hand, in the case of a person having a large pinna, the pinna holds, with a smaller holding power, a housing inserted into an external ear canal, so that the housing may fall due to a small impact.

For this reason, separate headphones have been proposed in recent years. The separate headphones achieve portability of inner-ear headphones and a good fit of open-air headphones. In such headphones, the housings of a left channel and a right channel are separated from each other, an ear hanger is attached to each of

the housings, and the ear hanger can be hung along the base of a pinna (in the present specification, these earphones will be referred to as "hanging-type earphones").

However, in the conventional separate hanging-type earphones, ear hangers are integrally attached to housings and the housings are pressed and urged to pinnas by using the torsional elasticity of the ear hangers.

Hence, as in the conventional art, when pinnas vary in size among individuals, particularly when a pressing force applied to a housing is changed by an angle of aperture, some people may feel pain and the earphones are likely to fall from ears due to a difference in contact with pinnas.

Thus, the present applicant proposes a hanging-type earphone comprising attachment position adjusting means as described in Patent Document 1 (Japanese Patent Application Publication No. 2002-34089). This headphone comprises an ear hanger bent along the base of a pinna, a shaft part which is attached to one end of the ear hanger at the front of the pinna, and an electroacoustic transducer unit rotationally supported by the shaft part via a bearing part. With this configuration, when the ear hanger is hung and supported along the base of a pinna, the shaft part supporting a housing is disposed at the front of a tragus, so that the pinna is not pressed. Additionally, the housing can be easily fit to the pinna.

However, the conventional technique disclosed in Patent Document 1 results in a large number of components, and thus an assembling process becomes complicated. Further, since the hanging position of the ear hanger on the base of the pinna is fixed, the position cannot be changed later when necessary.

SUMMARY OF THE INVENTION

In view of the problems of the conventional art, an object of the present invention is to provide a hanging-type earphone which achieves a simple configuration and allows an ear hanger to be hung and supported on the base of a pinna with a variable position.

The present invention is devised to attain the object and comprises a housing having an electroacoustic transducer unit, an ear hanger formed so as to be placed along the base of a pinna, and an arm connected between the housing and the base end of the ear hanger, wherein the arm has an end rotationally connected to the housing and the other end rotationally connected to the base end of the ear hanger.

According to a preferred embodiment, the ear hanger comprises an elastically deformable spring member at least on the base end.

Further, it is preferable that the housing be an inner ear inserted into the external ear canal of the pinna and the housing has a code drawn through a code bush which is guided and drawn to the intertragic notch of the pinna.

With this configuration, the housing and the ear hanger are rotationally connected to each other at two points through the arm. Thus, it is possible to freely change the position of the ear hanger while positioning the housing on the external ear canal of the pinna, and positively support the ear hanger on the base of the pinna.

Moreover, in this case, the housing is formed of an inner ear inserted into the external ear canal of the pinna, and the code is drawn, during placement, from the inner ear through the code bush positioned in the intertragic notch of the pinna, so that the ear hanger can be supported on a preferred position on the external ear canal of the pinna while being operated with one hand in a state in which the placement position of the inner ear is fixed by the code bush.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view showing that a hanging-type earphone of the present invention is used on a right pinna;

FIG. 2A is a rear view of the hanging-type earphone;

FIG. 2B is a left side view of the hanging-type earphone;

FIG. 3A is an exploded sectional view specifically showing a connected structure of an inner ear, an ear hanger, and an arm;

FIG. 3B is a sectional view showing the assembly of a connected part of the inner ear, the ear hanger, and the arm;

FIG. 4A is an explanatory drawing for explaining an operating procedure for placing the hanging-type earphone onto a pinna;

FIG. 4B is an explanatory drawing for explaining the operating procedure for placing the hanging-type earphone onto the pinna;

FIG. 4C is an explanatory drawing for explaining the operating procedure for placing the hanging-type earphone onto the pinna;

FIG. 4D is an explanatory drawing for explaining the operating procedure for placing the hanging-type earphone onto the pinna; and

FIG. 5 is a front view showing that the hanging-type earphones (a pair of right and left earphones) are actually used.

DETAILED DESCRIPTION

FIG. 1 is an enlarged front view showing an example where the present invention is formed to be applied to a right pinna. FIG. 2A is a reduced rear view of FIG. 1 and FIG. 2B is a reduced left side view of FIG. 1.

According to these drawings, a hanging-type earphone comprises a housing 11 having an electroacoustic transducer unit (not shown), an ear hanger 21 hung along the base of a pinna 1 (FIG. 4), and an arm 41 interposed between the housing 11 and a base end 22 of the ear hanger 21.

The housing 11 is formed as an inner ear 12 inserted into the external ear canal of the pinna 1 and is connected to an end 42 of the arm 41 through the external central part of the housing 11. Referring to the drawings, the inner ear 12 will be described below as an example of the housing 11.

As shown in FIG. 4, the inner ear 12 is formed so as to be inserted into the external ear canal of the pinna 1 and held by a tragus 2 and an antitragus 3. A code bush 20 for drawing a code C is guided to an intertragic notch 4 of the pinna 1 and is drawn therefrom.

The ear hanger 21 has the base end 22 connected to the other end 44 of

the arm 41 and is attached to the arm 41 as a cantilever structure opened on the side of an end 26.

To be specific, the ear hanger 21 is constituted of a straight part 23 which rises from the base end 22 with a proper length, a bent part 24 formed almost like an S-shaped curve from the end of the straight part 23, and an ear cuff 25 bent from the bent part 24 along the base of the pinna 1. The straight part 23, the bent part 24, and the ear cuff 25 are integrally formed.

In this case, the ear hanger 21 is formed of a plate-like metallic member made of a steel material, a titanium alloy, and so on. For a better fit, the ear cuff 25 comprises a covered part 27 which is covered with a predetermined resin material circular in cross section.

FIG. 3 is an explanatory drawing which partially includes a cross section to specifically illustrate a connected structure of the inner ear 12, the ear hanger 21, and the arm 41 which are configured in the above-described manner. FIG. 3A shows a disassembled state and FIG. 3B shows an assembled state.

As is evident from FIG. 3A, on the side of the inner ear 12, a washer faced female screw 14 and an elastic ring 15 made of a rubber material or the like are disposed on the arm 41 in this order from the outer side (from the bottom in FIG. 3A).

From the inner side (from the top in FIG. 3A), a washer 19 which is disposed on a through hole 12a provided in the inner ear 12 and a washer faced male screw 18 which is supported through the washer 19 are arranged in this order. The washer 19 and the screw 18 are integrated to constitute a connecting member 13.

To be specific, in the arm 41, an opening edge 44 of a through hole 43 is introduced into a receiving groove 16 provided on the outer periphery of the elastic ring 15. In this state, a male screw part 18a of the washer face male screw 18 is guided to the space of the elastic ring 15 through a through hole 12a in the inner ear 12 and the washer 19 supported on the through hole 12a, and the washer faced male screw 18 is secured to the washer faced female screw 14 by

screwing. Thus, the inner ear 12 and the arm 41 are integrally connected to each other in a journal structure shown in FIG. 3B.

Further, in this case, in order to reduce a contact area of the outer periphery of the washer faced female screw 14 to reduce a friction, the inner periphery of the elastic ring 15 has a convex part 17 which is expanded to the inside. With this configuration, it is possible to provide a degree of freedom of rotation such that the washer faced female screw 14 constituting the connecting member 13 can swing about ± 5 degrees with respect to the arm 41. Therefore, the inner ear 12 which is connected to and follows the washer faced female screw 14 can be held by a tragus and an antitragus at a preferred angle, thereby improving a fit during attachment and use.

As shown in FIG. 3B, the ear hanger 21 is integrally connected to the other end 45 of the arm 41 by using a connecting member 28 through a through hole 46 bored on the other end 44 of the arm 41. The connecting member 28 is constituted of a washer faced male screw 34 and a washer faced female screw 35 which are disposed through a bearing part 29, two washers 36 and 37, a spring washer 38, and two sliders 39 made of a synthetic resin or the like having a small friction coefficient.

To be specific, in the bearing part 29, a small diameter part 31 is formed which has a hole 30 for supporting a washer part 34a of the washer faced male screw 34 on the inner side (the top in FIG. 3B) and a large diameter part 32 is formed which is connected to the small diameter part 31 and communicates with the outside (the bottom in FIG. 3B). Moreover, a fixing hole 33 is formed in which the base end 22 of the ear hanger 21 is fixed and held to support the ear hanger 21 in a cantilever manner.

Thus, as shown in FIG. 3A, during assembly, the washer faced male screw 34 is disposed inside the bearing part 29. The washer 36, the spring washer 38, the washer 37, and the slider 39 are disposed in this order from the inside between the bearing part 29 and a part having the through hole 46 on the other end 44 of the arm 41. The washer faced female screw 35 is disposed outside the

arm 41 with the slider 39 interposed between the washer faced female screw 35 and the arm 41. In this arrangement, the male screw part 34a of the washer faced male screw 34 is secured to the washer faced female screw 35 by screwing, so that the bearing part 29 is integrally connected to the arm 41 through the through hole 46 bored on the other end 45 of the arm 41 in the journal structure of FIG. 3B.

Additionally, the ear hanger 21 has the base end 22 fixed and supported in a cantilever manner through the fixing hole 33 of the bearing part 29, so that the ear hanger 21 is supported by the journal structure of the bearing part 29 and rotationally connected to the arm 41. In this case, the ear hanger 21 is fixed by insert molding in which the base end 22 of the ear hanger 21 is fixed on a predetermined position in a mold, and then a molten resin is injected and hardened therein, so that the ear hanger 21 is integrated with the bearing part 29.

The base end 22 of the ear hanger 21 can be fixed to the bearing part 29 also by, for example, joining and fixing the base end 22 with an adhesive later, or the base end 22 can be fixed in a suitable screw structure.

Referring to FIGS. 5A to 5D, the following will discuss an operation of an example of the present invention configured thus as shown in FIG. 1. The operating procedure of the present invention placed onto a right pinna will be described below. First, the ear hanger 21 is rotated in the opening direction with respect to the arm 41. After that, as shown in FIG. 4A, the inner ear 12 is inserted into the external ear canal of the pinna 1 and held by the tragus 2 and the antitragus 3. At this point, the code bush 20 is guided to the intertragic notch 4 of the pinna 1 and fixed therein, so that the inner ear 12 is also held in the external ear canal so as to hardly rotate.

After the inner ear 12 is disposed in the pinna 1, the ear hanger 21 is pressed to the pinna 1 as shown in FIG. 4B, and the ear hanger 21 is rotated to a state shown in FIG. 4C, so that the ear cuff 25 can be moved along the base of the pinna 1. Finally, as shown in FIG. 4D, the ear cuff 25 can be supported so as to be hung over the base of the pinna 1.

In other words, the ear hanger 21 is supported by two rotatable shafts via the connecting members 13 and 28 disposed on the end 42 and the other end 45 of the arm 41. Thus, it is possible to arbitrarily change a supporting position relative to the pinna 1 when necessary. Further, on the placed ear hanger 21, the ear cuff 25 is supported with elastic deformation on the base of the pinna 1 with the bent part 24 serving as a base end, thereby achieving a preferred fit.

Therefore, even when pinnas vary in size among individuals, the present invention makes it possible to finely adjust the supporting position of the ear hanger 21 to the optimum position for the user with a simple configuration. Thus, it is possible to stably support the ear hanger 21 without causing pain or pressure on the pinna or dropping the ear hanger 21. After use, the ear hanger 21 can be detached quite easily by going through the reversed steps.

The above explanation described the present invention in accordance with the illustrated example. The specific configuration of the present invention is not limited to this example. For example, the housing may be an inner-ear housing, an open-air housing, or an enclosed housing placed over a pinna. At least the ear hanger may be rotationally connected to the arm by applying a lodging force to the housing through a torsion coil spring or the like. Further, when necessary, the ear hanger may be connected while the arm is urged to the housing via a torsion coil spring or the like so as to rotate upward with respect to the housing. Furthermore, the ear hanger can be entirely formed as a one-piece resin mold. In actual use, the hanging-type earphones of the present invention are combined as shown in FIG. 5.

CLAIMS:

1. A hanging-type earphone, comprising:
a housing having an electroacoustic transducer unit,
an ear hanger formed so as to be placed along a base of a pinna, and
an arm connected between the housing and a base end of the ear hanger,
wherein the arm has an end rotationally connected to the housing and the
other end rotationally connected to the base end of the ear hanger.
2. The hanging-type earphone according to claim 1, wherein the ear hanger
comprises an elastically deformable spring member at least on the base end.
3. The hanging-type earphone according to claim 2, wherein the housing is
an inner ear inserted into an external ear canal of the pinna and the housing has a
code drawn through a code bush which is guided and drawn to an intertragic
notch of the pinna.