

[54] **HEADPHONE CONSTRUCTION**

[75] Inventors: **Karl Cech**, Modling; **Karl Reinthaler**, Vienna, both of Austria

[73] Assignee: **AKG Akustische u. Kino Gerate G.m.b.H.**, Vienna, Austria

[22] Filed: **May 21, 1974**

[21] Appl. No.: **471,896**

[30] **Foreign Application Priority Data**

June 1, 1973 Austria 4805/73

[52] **U.S. Cl.** **179/156 R**

[51] **Int. Cl.²** **H04M 1/05**

[58] **Field of Search** **179/156 R**

[56] **References Cited**

UNITED STATES PATENTS

3,306,991 2/1967 Wood 179/156 R X

3,447,160 6/1969 Teder 179/156 R X

Primary Examiner—William C. Cooper

Attorney, Agent, or Firm—McGlew and Tuttle

[57] **ABSTRACT**

A headphone comprises an earphone for each ear, a first inner headband forming a flat large diameter curve extending between the earphones and adapted to engage against the top of the wearer's head during use, and a second headband of a smaller diameter curve than the first headband, extending between each side of the wearer's head and connected adjacent each end to the first headband. An elastic suspension extends between the connection of the first and second bands to the respective earphones, and the elastic suspension acts upwardly preferably by an amount equal to the weight of each earphone.

10 Claims, 5 Drawing Figures

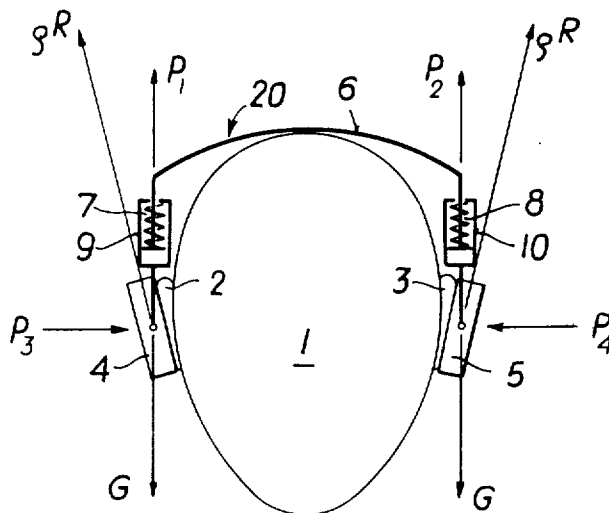


FIG. 1

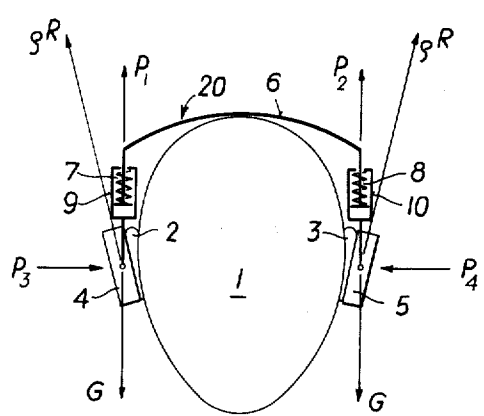


FIG. 2

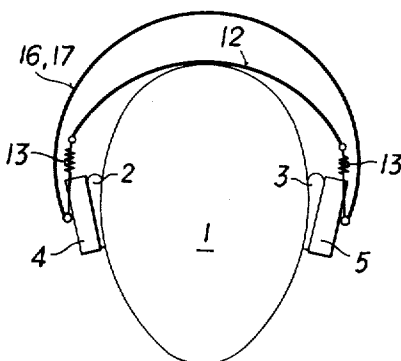


FIG. 3a

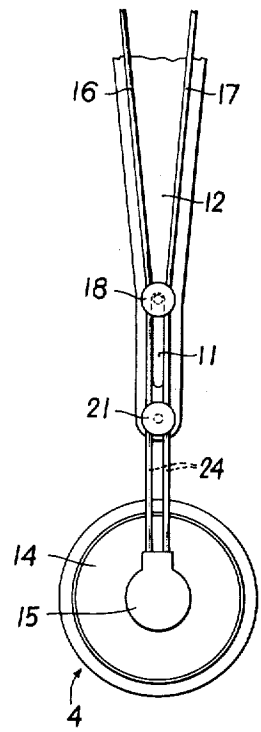


FIG. 3b

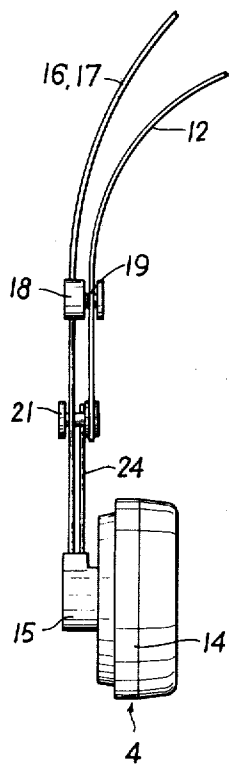
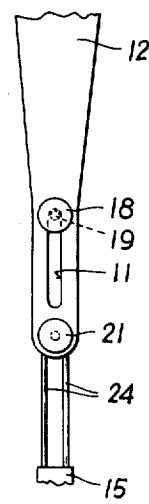


FIG. 3c



HEADPHONE CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to the construction of headsets or headphones and, in particular, to a new and useful headphone, including an inner headband engageable with the head which is elastically connected at each end to a respective earphone, and an outer headband providing a resilient inner force on the headphones which extends outwardly from the inner headband and is connected at each end thereto.

2. Description of the Prior Art

The present invention relates particularly to a headphone which comprises two ear pieces and at least one resilient headband which interconnects the ear pieces and is adapted to rest on the top of the user's head during use of the headphone. Such headphones are well known in the communication engineering and entertainment electronics fields. Since these sets are principally used by different persons, it is necessary to provide adjustment mechanisms permitting the adaption of the headset to the individual shape of the user's head. The construction of such headsets must, therefore, take into account the fact that the spacing from the top of a person's head to each ear may be substantially different from one person to the next.

In order to compensate for the differences of the individuals who use the headphones, numerous constructions have been provided. The most simple and most largely used construction is one in which the ear pieces are mounted for displacement on the resilient headband. The drawback of this construction and similar constructions is that when different persons used the headphone, a new adjustment is necessary in each case. In order to ensure the fit of the headpiece and to preserve the adjustment, a sufficient friction is provided between the headband and the ear pieces to be shifted thereon. In consequence, when such conventional headphones are put on, the friction must be overcome by using a certain force and only a repeated shifting of the ear pieces on the band on both sides results in a proper fit. Projecting portions are sometimes provided on the headband which are intended to facilitate the displacement of the ear piece.

SUMMARY OF THE INVENTION

The invention provides a new headphone construction which may be adjusted simply without requiring force. The inventive construction has been evolved from the observation that when a headphone is put on, the hands grip the earpieces and pull them apart while the headband itself is held over the head and the assembly is moved downwardly until the headband comes into contact with the top of the head. Thereafter, the earpieces are shifted on the headband back and forth until they cover the ears in a proper manner. With the invention, adjustments necessary to place the ear pieces in the proper location can be carried out by persons who are not necessarily skillful and it can lead to a proper fit of the headphone. With the inventive headphone, it is only necessary to perform the first part of the movements of applying the headphones to the head, that is, to hold the earphones over the head until the headband engages the top of the head. Thereafter, it is a simple matter to then position each earpiece directly in the proper location in respect to the associated

ear. Further manipulation is not necessary because the headphone is substantially self-adjustable.

The invention provides a headpiece which includes a headband which forms an inner headband which rests against the head of a wearer during use and which is connected to each earpiece through a resilient support. The resilient support is dimensioned so that during its entire range of adjustment, its resilience is approximately equal to or preferably slightly stronger than the gravitational force acting on the earpiece, including the connecting cables.

In the preferred form, the headpiece of the invention includes an inner headband which rests against the head and an outer headband which is connected at each end to the inner headband. The inner headband which contacts the user's head is resilient only in respect to the portion which connects it to the individual earpieces in respect to movements in directions toward and away from the ears. The outer headband is provided with resilience so that it exerts an inwardly directed force to the associated ends of the inner headband or to a location spaced from the earpieces at the inner headband. The resilience extends substantially perpendicular to the planes in which the elastic forces of the suspension for each earpiece act. The headband which surrounds the user's head without contacting it and which is located exteriorally of an inner headband is usually made of steel wires, a spring steel strip or a resilient synthetic material. The headband resting on the head is made of a thin flexible material preferably a strip of synthetic material.

Accordingly, it is an object of the invention to provide an improved headphone construction which includes at least one headband which interconnects two earpieces and rests during use in the middle portion of the top of the user's head and which also includes an elastic connection between the ends of the headband and each earpiece providing an elastic suspension upwardly and downwardly in respect to the ears.

A further object of the invention is to provide a headphone set which includes an inner headband adapted to rest against the wearer's head and having resilient means at each end supporting an earpiece therefrom and including an exterior or outer headband extending over the inner headband and connected at each end to said inner headband and exerting an inward biasing force thereon in a direction toward each ear.

A further object of the invention is to provide a headphone which is simple in design, rugged in construction, and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the Drawings:

FIG. 1 is a schematic front elevational view of a headset constructed in accordance with the invention;

FIG. 2 is a view similar to FIG. 1 of another embodiment of the invention;

FIG. 3a is a partial side elevational view of the headband of a type shown in FIG. 2;

3

FIG. 3b is a side elevational view of the headband shown in FIG. 3a; and

FIG. 3c is a rear elevational view of the headphone shown in FIG. 3a.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in particular, the invention embodied therein, comprises a headphone set or headphone, generally designated 20, which includes earpieces 4 and 5 which are interconnected by a headband 6 which is adapted to rest against the top middle portion of a person's head 1. The earpieces 4 and 5 are pressed against the person's ears 2 and 3 due to the resilience P of the headband 6 which is shown as being resolved into two force components P_3 and P_4 . The weights of the earpieces are designated by the letters G_1 and G_2 . The weights are opposed by the elastic forces P_1 and P_2 which are produced by two spring members 7 and 8 which are carried in a resilient suspension which includes holders or guides 9 and 10, respectively. Earpieces 4 and 5 are suspended from the cylindrical portions 9 and 10 and the weights of these earpieces are overcome by the resilient biasing of the springs 7 and 8. Guides 9 and 10 also transmit resilient forces P_3 and P_4 to the individual earphones 4 and 5, respectively.

The resulting force R which acts on each of the earpieces determines the frictional resistance R on the contact surfaces of the earpieces applying against the external ears of the user, where μ is the coefficient of friction. The spring force of the headband 6 and the return forces of springs 7 and 8 may easily be dimensioned so they counterbalance the weights G_1 and G_2 of the earpieces.

Consequently, the inventive headphone can be put on in a single smooth motion because the only thing to watch is that the earpieces cover the ears. The springs 7 and 8 bias the earpieces upwardly into the most retracted position when the earphone is put on, and it is then sufficient to pull the earpieces down to the ears in a simple and easy motion without any great force. After releasing the earpieces, they remain in their proper position on the user's ears.

In the embodiment of the invention shown diagrammatically in FIG. 2, the headphone includes two headbands including an outer headband formed of two steel wires 16 and 17 which also may be used as electrical leads, if desired. The construction assures the function of the headband shown in FIG. 1, that is, to produce the force components P_3 and P_4 which are needed for pressing the earpieces against the user's head.

An inner or second headband 12 possesses substantially no resilience and it is connected to the earpieces 4 and 5 by means of an elastic suspension in the form of elastic members 13, such as helical springs, flat coil springs or bands. During use, the inner second band rests against the top of the user's head, as shown in FIG. 2.

FIGS. 3a, 3b and 3c show constructional details of the embodiment which is schematically indicated in FIG. 2. The construction includes a coupling piece 15 which may be a joint which is fixed to the housing 14 of the earpiece. Resilient wires 16 and 17 of the outer headband are anchored by their end portions with a block piece 18 which is spaced away from coupling piece 15 and retains the two wires 16 and 17 at a spaced location from a holding member 21 which is spaced upwardly from coupling piece 15. The inner

4

headband 12 is made of a thin flexible sheet of a material, such as a synthetic material, and it is provided with a longitudinal slot 11 which is engaged over a projecting pin portion 19 of the block 18 which may slide in the groove 11. The ends of the inner band 12 continue beyond the block 18 and engage the member 21. An elastic suspension in the form of an elastic element, generally designated 24, extends between the ends of the inner band 12 and the respective earpieces 14. The elastic band 24 suspends the ear pieces 4 and 5 in a manner such that they are retracted upwardly by the resilient force of the band and may be extended downwardly from their retracted position during the application to a wearer's ears.

In order to put the inventive headphone on a person's head, the headphone is held over the head and moved downwardly. During this downward movement of the earpieces, first the thin flexible band 12 will apply against the top of the user's head. In this position, however, the earpieces are still located above the ear opening. While continuing the downward movement until the earpieces cover the ears, the rubber band 24 is stretched and produces a return force approximately corresponding to the weight of the earpieces. The variable return force corresponding to the respective distance between the top of the user's head in the ear opening becomes substantially ineffective due to the friction between the earpiece pad and the ear so that even after wearing the headset for hours, the inventive headphone does not produce any disagreeable pressure sensations on the ear, particularly when it is made of a lightweight construction.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A headphone construction comprising two earpieces, at least one head band interconnecting said two earpieces and adapted to rest during use by its middle portion against the top of the user's head, the connection of said two earpieces to said headband including a resilient suspension holding the earpieces adjacent the ends of said band, said resilient suspension comprising a resilient member having a spring force slightly stronger than the effective gravitational force on said earpieces.

2. A headphone comprising an earphone for each ear, a first outer curved headband having a first radius of curvature and extending between said earphones, a second inner curved head band forming a flat curve having a second radius of curvature smaller than said first radius of curvature and connected to each end of said first headband, and an elastic suspension connected to the ends of said second inner headband and to each earphone and providing an upwardly acting resilient suspension of said earphones.

3. A headphone according to claim 2, wherein said second inner headband is adapted to rest against the head of the wearer and said first outer headband is resilient and each end is biased inwardly toward the connection thereto of said second inner headband.

4. A headphone according to claim 2, wherein said second inner headband rests against the head of the wearer and said first outer headband extends outwardly from the head of the wearer and is not in contact therewith, said resilient suspension comprising resilient ele-

5

ments extending from the ends of said second inner headband to the respective earpieces.

5. A headphone according to claim 4, wherein each of said headpieces includes a coupling, said inner and outer headbands being connected together adjacent each of their respective ends and said elastic suspension comprising a band extending from the connection of said first and second headbands to said coupling.

6. A headphone according to claim 2, wherein said second inner headband comprises a flexible extensible band.

7. A headphone according to claim 2, wherein said first outer headband is resilient and applies force inwardly in a direction substantially normal to the resilient suspension of said earpieces.

8. A headphone according to claim 2, wherein said first outer headband comprises a pair of spaced apart wires, said second inner band being in contact with a

6

person's head and being made of a thin flexible sheet possessing only a small elastic force.

9. A headphone according to claim 2, including a coupling member connected to each of said earpieces, said resilient suspension being connected between said coupling member and said first outer headband, said first outer headband comprising two spaced apart wire members, a connecting pin connected between said wire members and holding said suspension, a block piece spaced from said connecting member and connected between said two wires and having a pin member, said second inner band having a slot therein in which said pin is engaged to permit relative movement of said inner band relative to said outer band.

10. A headphone according to claim 9, wherein said wire members comprise two steel wires coated with a synthetic material.

* * * * *

20

25

30

35

40

45

50

55

60

65