

Sept. 13, 1966

G. F. FALKENBERG

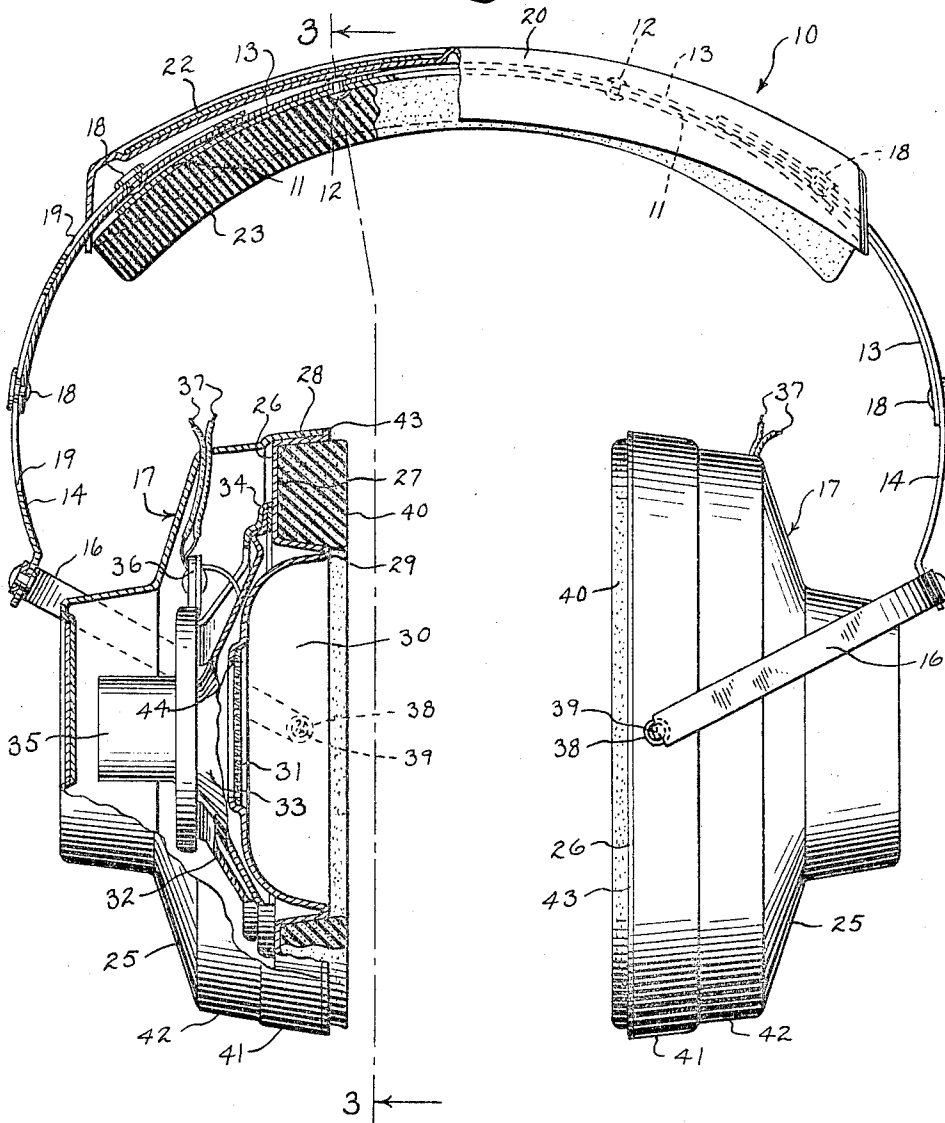
3,272,926

HEADPHONE ASSEMBLY

Filed April 24, 1963

2 Sheets-Sheet 1

Fig. 1



INVENTOR
GUSTAVE F. FALKENBERG

BY *Arthur H. Skidel*

ATTORNEY

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G. F. FALKENBERG

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Fig. 2

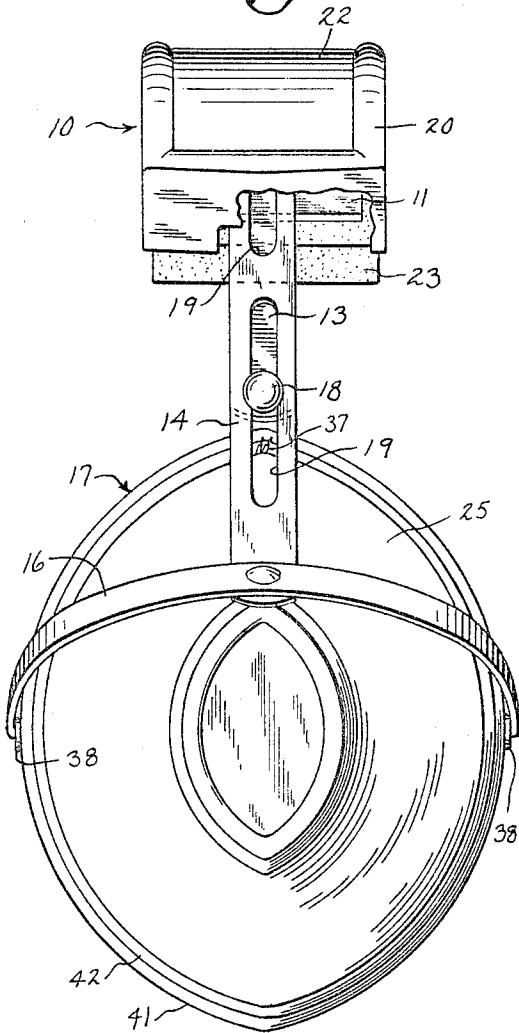


Fig. 3

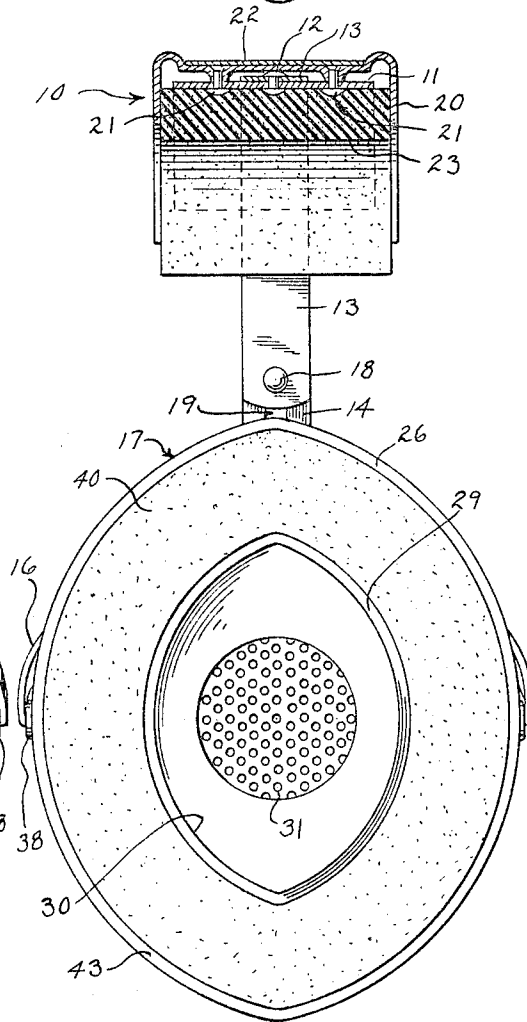
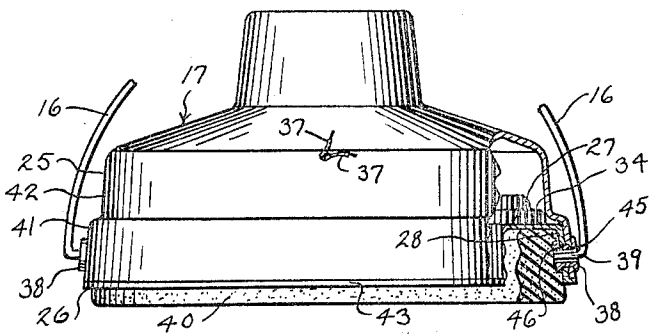


Fig. 4



INVENTOR
GUSTAVE F. FALKENBERG

BY

Arthur H. Sidel

ATTORNEY

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HEADPHONE ASSEMBLY

Gustave F. Falkenberg, Brookfield, Wis., assignor to Dimensional Products, Inc., Milwaukee, Wis., a corporation of Wisconsin

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This invention relates to headsets applicable for stereophonic and high fidelity reception, and it more specifically resides in a headphone structure including an outer shell forming a housing and an earcup extending over one end of the shell that are both of lightweight construction with the peripheral portion of one nested within the periphery of the other for a facile assembly, and if desired the earcup may mount the associated speaker enclosed within the shell to have the acoustical element firmly seated with respect to the user's ear.

The extensive use of stereophonic and high fidelity sound reproducing apparatus has created a need for improved headsets incorporating headphones that are lightweight and comfortable. Recordings of the long play type, and recordings played several at a time, will not be satisfactorily enjoyed if audibly transmitted through headsets having heavy parts, such as earcups and housings molded from hard setting resins of a bulk to provide threaded assembly with one another. Proper comfort in the wear of a headset requires soft cushioning around the ear and a lightness that will not induce fatigue with time. Also, a satisfactory headset must meet a high level of acoustic performance including fidelity of sound reproduction, the elimination of internal reverberations of the parts and the exclusion of exterior sound disturbances.

To meet these requirements the present invention provides a headphone having a housing formed as a thin shell and an earcup that likewise can be of a thin walled construction. One of these pieces may nest within the other, to facilitate assembly, and the thin walled construction provides a lightness in which the principal bulk of the headphone will reside in the speaker enclosed within the housing.

Further, the attainment of a lightweight construction is facilitated by the retention of one part nested within the other, as mentioned, by novel use of a resilient bail extending about the headphone and entering both the housing and the earcup from opposite sides. The bail then applies inwardly directed forces retaining the parts in its assembly. As a result, heavy or bulky parts used to unite the various sections are eliminated, so that excessive weight is not developed merely for the purpose of assembly.

An object of this invention is to provide a headphone having a structure which permits relatively rapid and easy assembly, and disassembly, of its component parts.

Another object of this invention is to provide a headphone for the prescribed type of headset wherein a speaker may be mounted along its open end rather than at its magnet end.

A further object of this invention is to provide a headphone enclosure of a structure that will enable facile and removable attachment of the resilient cushion that fits against the user's head. The cushion can then be cleaned, or replaced, as desired.

It is a further object of this invention to provide a headset headphone of lightweight construction that may be worn for periods of time without discomfort.

The objects of this invention are accomplished through the provision of the housing and earcup described above. Also, the earcup may be of a molded piece which presents a panel portion for attachment of the open end of a speaker on one side and the mounting of a resilient ear encircling cushion on the opposite side. This cushion can be detached from the earcup, and yet held firmly in

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place without the use of adhesives or other fastening means, by shaping the earcup with a channel defined in part by the mounting panel portion.

The foregoing and other objects will become apparent from the following description and the accompanying drawings which form a part hereof and illustrate an embodiment of this invention.

In the drawings:

FIG. 1 is a front view partly in section and with portions broken away showing a headset constructed in accordance with this invention,

FIG. 2 is an end view of the headset shown in FIG. 1,

FIG. 3 is an end view, partly in section, taken along the plane of line 3-3 of FIG. 1, looking in the direction of the arrows, showing an earpiece assembly from its inner end that would be next to a wearer's ear, and

FIG. 4 is a top view partly in section and with portions broken away illustrating one of the headphones of the headset of FIG. 1.

In FIGS. 1-4 there is illustrated a headset 10 including a headband 11 to which is attached, as by rivets 12, a stationary headphone support 13 that extends across the headband and projects beyond each end thereof. A movable headphone arm 14 is slidably attached to each end of the stationary headphone support 13, there being two such arms 14 in the headset. A U-shaped bail or bracket 16 is affixed to the outer end of each movable arm 14 and a headphone 17 is mounted between the arms of each bail 16. Rivets 18 are affixed to the stationary headphone support 13 as indicated and engage slots 19 formed in each movable headphone arm 14 so that the arms may be slidably adjusted to position the headphones as the wearer may desire. The support 13, arms 14 and bail 16 are thus arranged to provide means for supporting the headphones 17 from the headband 11. A cover 20 is attached, as by rivets 21 (FIG. 3) to the headband 11 and includes a top-plate 22 to cover the rivet ends. A resilient cushion 23, which may be a foam rubber, flexible plastic foam or other suitable material, is attached, as by glue, to the underside of the headband 11 to provide comfort for the wearer of the headset.

This invention relates to the structural elements which are combined to provide the headphones 17. Referring now to FIG. 1, each headphone 17 comprises an outer shell 25 and an earcup 26. The outer shell forms a housing with its peripheral rim portion 41 defining an open end, and the earcup 26 extends over this open end of the outer shell. The earcup 26 includes a panel portion 27 that partially closes the open end of the outer shell, a peripheral wall 28, and an inner ridge 29. The panel portion 27 lies between and joins the peripheral wall and the inner ridge and is depressed from the outer extremity of each of these elements so that a channel is defined by the panel 27, wall 28 and ridge 29. To the inside of the ridge 29, there is provided an ear receiving cavity 30 having a central aperture 44 covered by a grid 31. The cavity 30 is preferably large enough to entirely cover the ear of a user of the headset.

In the assembled condition, the earcup 26 extends across the open end of the outer shell 25 with the peripheral wall 28 of the earcup nested within the peripheral rim 41 of the outer shell. The peripheral rim 41 may be slightly offset from the wall portion 42 of the outer shell to provide an annular area for the reception of the peripheral wall of the earcup. Additionally, the edge of peripheral wall 28 of the earcup can include an out-turned flange 43 that abuts the lip of the open end of the outer shell to prevent the earcup from being inserted too far in the outer shell. The earcup and outer shell can be readily manufactured of lightweight molded plastic to obtain the desired configurations and provide a light, thin walled construction for each.

A speaker is mounted in each headphone 17. The speaker is of usual construction and includes a frame 32 enclosing a speaker cone 33 and having a flange 34 surrounding the open end of the speaker cone. The magnet end of the speaker is enclosed by the rear wall 35 of the frame 32. There may be one speaker in each headphone and the speakers may be wired to a suitable lead-in cable, not shown, for connection to a sound source. A terminal 36 is mounted on the speaker frame 32 and has two attached wires 37, which project through the headphone, for this purpose. The wiring of the speakers for connection to a sound source, either monophonic or stereophonic, may be conventional and is not further illustrated in the drawings.

The manner in which the speaker may be mounted in the headphone is also one of the important features of the present invention. Heretofore, in headsets of this type, i.e., incorporating speakers in the respective headphones, the speakers have been mounted in such fashion that the magnet end of the speaker frame is fixed to the headphone, often by being inserted in a hollowed wooden block. However, the present invention provides for mounting the speaker by attaching the flange surrounding its open end to the earcup 26 of the headphone. Thus, as illustrated in FIG. 1, the flange 34 at the open end of the speaker frame 32 is attached to the rear or inner surface of the panel portion 27 of the earcup 26 and the outer shell 25 encloses the speaker. The flange 34 in a speaker of this type may be fitted with a fibrous gasket that will facilitate gluing of the speaker to the panel portion 27 in the desired manner, although other forms of attachment may also be used. This manner of mounting the speaker in a headphone is believed to provide an acoustically improved headphone assembly in a headset of this general type.

As previously mentioned, the earcup 26 may be formed so as to fit into the open end of the outer shell 25. Referring to FIG. 4, the peripheral rim of the outer shell has a pair of oppositely disposed apertures 45 each of which is in alignment with one of a pair of oppositely disposed apertures 46 in the peripheral wall of the earcup. A grommet 38 extends through each such mated pair of apertures 45 and 46 and the ends of each arm of the bails 16, which are shown as having a small in-turned tongue 39, fit into the grommets for attachment of the headphones to the bails. The bails are formed of metal to have a slight springiness or resiliency so that their arms are urged towards one another to snugly hold the outer shell and the earcup in the desired relationship without the use of additional fastening means. This mode of attachment of the headphones to the bails also permits tiltable adjustment of each headphone.

The inner ridge 29 of the earcup 26 is spaced from the peripheral wall 28 and a circumferential channel is thusly defined between these two walls, which project from the panel portion 27 of the earcup. A ring-shaped, or doughnut-shaped, ear cushion 40 is illustrated as being inserted in this channel. The cushion is of resilient materials, such as rubber, foam rubber, foamed flexible plastic, or the like. When formed of resilient material, and when the wall 28 and ridge 29 are sufficiently deep in relation to the thickness of the cushion, the cushion may be pressed in place and held in position without the use of any adhesive or other fastening means.

The headphone construction as thusly described permits relatively easy and rapid assembly of the separate members to form the completed structure and ready attachment of the headphones to the headset. To assemble a headphone, the speaker is merely joined, as by gluing, along its open end to the earcup, the earcup is inserted in the outer shell, grommets placed in their respective holes, and then the headphone is attached to the bail of the headphone supporting means. Further, disassembly of the headphone, which may be necessary to repair or re-

place the speaker or its wiring for example, it also facilitated with the headphone construction of this invention. An ear cushion can then be snapped in place on the earcup. The cushion can be readily detached for washing or other purposes since no adhesive, or other fastening means, is needed to hold it in place. Additionally, this invention also provides for mounting the speaker in the headphone along its open front end rather than by its magnet end. The headphone structure and its mode of assembly are also particularly adapted for manufacture from lightweight, thin wall plastic material, say on the order of less than $\frac{1}{16}$ " or $\frac{1}{32}$ " thick, thereby enabling substantial reduction in the weight and bulk of the headphone which, in turn, leads to increased wearer comfort during prolonged periods of use.

There has thus been described a novel headphone enclosure construction capable of attaining the objects of this invention. The description and the drawings, for the purposes of illustration, have disclosed a specific form of this invention, but it is to be understood that other embodiments of the invention may be devised, and structural changes may be made in the embodiment hereinabove described, by those skilled in the art without departing from the true scope of the present invention. The scope of the present invention is best defined in the appended claims and limitations set forth in the above description need not be taken in a limiting sense except insofar as they are incorporated in the claims.

I claim:

1. In a headphone for a headset, the combination of: an outer shell forming a housing that has a peripheral rim defining an open end, said rim having apertures at two oppositely disposed points; an earcup extending over the open end of said outer shell and including a peripheral wall nesting within the peripheral rim of said outer shell and having apertures at two points each in alignment with an aperture in the outer shell, a depressed panel portion inward of and adjacent to said peripheral wall, an inner ridge defining the inner extent of said panel portion and forming a channel with said panel portion and said peripheral wall, and an ear receiving cavity to the inside of said inner ridge; a speaker within said headphone and mounted upon the rear of said earcup panel portion; a resilient cushion disposed in said channel; and a resilient bail with ends inserted through the aligned apertures in the peripheral rim of said outer shell and the peripheral wall of said earcup, which bail ends are urged toward one another by the resilience of the same.
2. In a headphone for a headset, the combination of: an outer shell forming a housing that has a peripheral rim defining an open end, said rim having apertures at two oppositely disposed points; an earcup extending over the open end of said outer shell and including a peripheral wall nesting within the peripheral rim of said outer shell and having apertures at two points each in alignment with an aperture in the outer shell, a depressed panel portion inward of and adjacent to said peripheral wall, and an ear receiving cavity to the inside of said panel portion; a speaker within said headphone and mounted upon the rear of said earcup panel portion; and a resilient bail with ends inserted through the aligned apertures in the peripheral rim of said outer shell and the peripheral wall of said earcup, which bail ends are urged toward one another by the resilience of the bail material.
3. In a headphone for a headset, the combination of: an outer shell forming a housing that has a peripheral rim defining an open end; an earcup extending over the open end of said outer shell and including a peripheral wall nesting within

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the peripheral rim of said outer shell, a depressed panel portion inward of and adjacent to said peripheral wall, an inner ridge defining the inner extent of said panel portion and forming a channel with said panel portion and said peripheral wall, and an ear receiving cavity to the inside of said inner ridge; a speaker within said headphone and mounted upon the rear of said earcup panel portion; and a resilient cushion disposed in said channel.

4. In a headphone for a headset, the combination of: an outer shell forming a housing that has a peripheral rim defining an open end, said rim having apertures at two oppositely disposed points; an earcup extending over the open end of said outer shell and including a peripheral wall nesting within the peripheral rim of said outer shell and having apertures at two points each in alignment with an aperture in said outer shell, a depressed panel portion inward of and adjacent to said peripheral wall,

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an inner ridge defining the inner extent of said panel portion and forming a channel with said panel portion and said peripheral wall, and an ear receiving cavity to the inside of said inner ridge;

a speaker within said headphone; a resilient cushion disposed in said channel; and a resilient bail with ends inserted through the apertures in the peripheral rim of said outer shell and the peripheral wall of said earcup which bail ends are urged toward one another by the resilience of the same.

References Cited by the Examiner

UNITED STATES PATENTS

2,989,598 6/1961 Touger et al. ----- 179—182

KATHLEEN H. CLAFFY, *Primary Examiner*.

W. C. COOPER, *Examiner*.