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3,303,902

EAR PIECE

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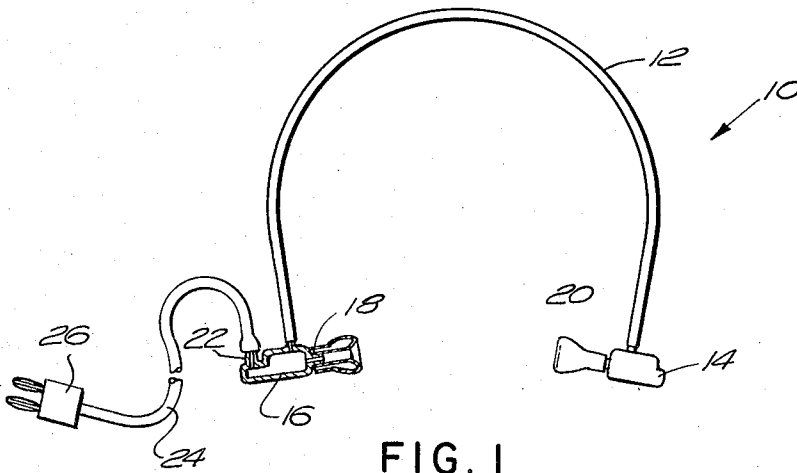


FIG. 1

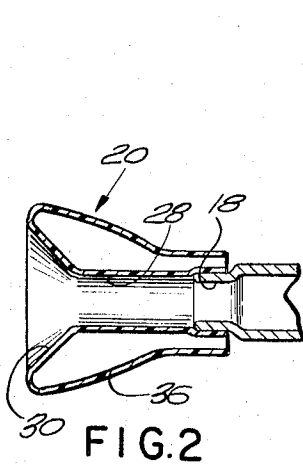


FIG. 2

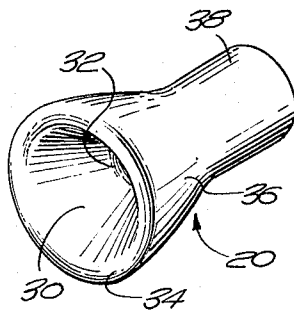


FIG. 3

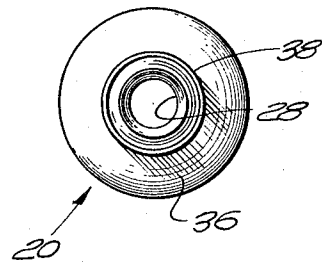


FIG. 4

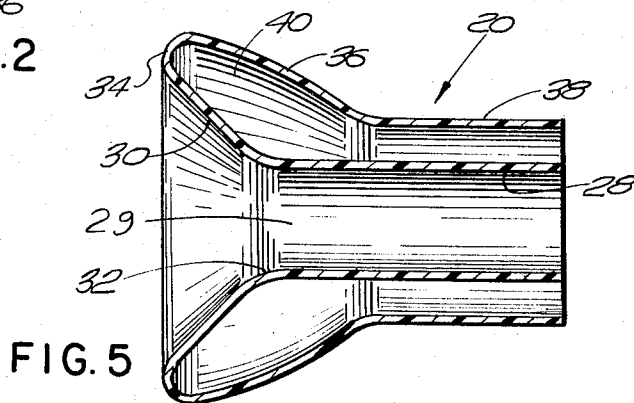


FIG. 5

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3,303,902
EAR PIECE

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6 Claims. (Cl. 181-23)

This invention relates generally to ear pieces for use with sound equipment and more particularly is directed towards a new and improved ear cushion attachment for use with head phones, stethoscopes, office transcribing equipment and similar hearing devices.

In certain types of air driven sound equipment, such as used aboard airplanes for passenger use for example, earphones are provided for each passenger. The passenger may plug his set into an adjacent outlet and select various audio channels such as the sound track for a movie being shown, music or the like. Each head set is provided with detachable ear pieces that are replaced at the end of each flight for sanitary purposes.

Heretofore headsets of the foregoing type become uncomfortable if worn for any extended period insofar as the ear pieces press against the wearer's ears. Existing ear pieces for this type of equipment have been unsatisfactory for various reasons. As a result, they are uncomfortable to wear for any great length of time. Furthermore, their cost has been relatively high and they do not provide a universal fit for all wearers.

Accordingly, it is an object of the present invention to provide improvements in ear pieces for use with sound transmission equipment of various types.

Another object of this invention is to provide a low cost, efficient and comfortable ear piece which will readily conform to the ear contours without producing discomforting pressures on the ear.

A further object of this invention is to provide a replaceable ear piece for head phones and the like and adapted to provide a universal fit for wearers.

More particularly this invention features an ear cushioning piece for attachment to an ear phone, comprising a thin ply of resilient material molded into a double walled tubular configuration one end of which is outwardly flared into a hollow conical configuration to form a bell-shaped hollow body. The inner and outer walls are spaced from one another to define an annular volume between the two walls with the two walls being connected to one another about the outer annular edge of the enlarged end portion. The opposing end of the inner wall is dimensioned to fit over a tubular post such as formed on ear phone head pieces, for example, whereby the ear piece may be readily slipped on and off for replacement. The soft double walled construction provides an extremely comfortable fit to the wearer's ear, sealing the ear from spurious sounds and conforming readily to the ear contours.

However, these and other features of the invention, along with further objects and advantages thereof, will become more readily apparent from the following detailed description of a preferred embodiment of the invention, with reference being made to the accompanying drawings, in which:

FIG. 1 is a view in front elevation, with portions broken away, of a headset of the sort used with various types of audio equipment,

FIG. 2 is a detailed sectional view on an enlarged scale showing an ear piece made according to the invention and mounted on an ear phone component shown in FIG. 1,

FIG. 3 is a view in perspective of an ear piece made according to the invention,

FIG. 4 is a rear elevation thereof, and,

FIG. 5 is a sectional side elevational view of the invention.

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Referring now to the drawings and particularly to FIG. 1, there is illustrated a typical headset of the sort employed with audio equipment such as installed for passenger use in airplanes and the like and disclosed more fully in U.S. Patent 3,217,831. The head set, which is generally indicated by the reference character 10, includes a curved springy headband 12 adapted to be clamped over the head. The head band is typically of a tubular plastic material and carries at each end molded housings 14 and 16. Each housing is formed with an inwardly projecting tubular post 18 on each of which is mounted a detachable ear piece 20. The housing 16 is also provided with tubular posts 22 to which is connected to pair of flexible tubes 24 carrying plugs 26 their ends for connection with a sound outlet.

Referring now more particularly to FIGS. 2 through 5 the ear piece will now be described in detail.

In general, the ear piece is of molded construction formed from a relatively soft, self-supporting resilient material such as polyvinyl chloride (PVC), rubber or the like. In any event, the ear piece 20 is molded into a hollow, double-walled, bell-shaped configuration as best shown in FIG. 5. The ear piece is formed with a cylindrical tubular inner wall 28, providing a central sound passage 29, the inside diameter of which is such as to fit snugly over a tubular post 18 as in FIG. 1 and is on the order of 1/2 inch or so in length and typically 1/4 inch in diameter. The wall thickness is quite thin being on the order of 10 to 30 thousandths of an inch. The inner wall 28 at its left-hand end as viewed in FIG. 5 flares outwardly to form a cone portion 30 having a smoothly rounded inner curve at 32 where it originates at the inner wall 28 and a smoothly rounded outer annular curved portion 34. From the curved end portion 34, the resilient outer wall extends back towards the opposite end of the ear piece, arching outwardly at 36 and then curving inwardly to form an outer tubular wall 38 concentric with but spaced from the inner tubular wall 28.

The outside diameter of the outer tubular wall 38 typically is 3/8" and the overall length of the ear piece typically is on the order of 3/4". The maximum diameter of the piece at the enlarged head end thereof is on the order of 5/8" of an inch. It will be understood that these dimensions are all by way of example and that specific dimensions may be varied in accordance with particular requirements to fit particular equipment.

The ear piece defines an annular inner volume 40 between the spaced inner and outer walls which is relatively large at the head or left hand end of the piece, but is reduced at the right hand end thereof. In any event, the ear piece is of hollow construction and the walls thereof are of a soft pliant material so that the piece may be readily deformed by pressure contact between the ear piece and the ear itself. It will be understood that the dimensions of the ear piece are such that it is intended for the piece to fit within the ear rather than over the entire ear as is the case with certain types of ear phones. Insofar as the ear canal is of irregular contour, it is desirable that the ear piece conform itself to the ear surface in order that the ear piece will seal against the ear to prevent the entrance of spurious noises. It is also desirable that the ear piece conform to the ear contours in order that the pressure contact between the ear piece and the ear will be uniform throughout. If the pressure is evenly distributed and is relatively light, it will be comfortable to the wearer and there will be no sharp pressure points causing pain or discomfort to the wearer. Insofar as the ear piece illustrated herein is extremely soft and is of hollow thin wall construction it conforms readily to the ear contours providing an excellent seal between the ear and the piece and providing an excellent cushion

so that the head set and ear pieces may be worn for extended periods without pain or discomfort.

The ear piece has other advantages in that it is quite sanitary insofar as the outer wall provides a smooth finished surface all about the ear piece and the two thin walls cooperate in such a manner as to provide a more efficient and more comfortable fit than is the case with a single walled type of ear piece. The two soft walls by reason of their resiliency and pliancy bear against a greater amount of ear surface than is the case with a single wall ear piece. The ear pieces are extremely easy and inexpensive to manufacture since they may be readily molded by machining a mandrel in the form of the inner volume of the ear piece, dipping the mandrel in liquefied molding material and then allowing the coating to cure.

The soft, pliant, double-walled construction permits relatively free lateral displacement of the enlarged head end of the piece so that it may be more or less pivoted with respect to the head band. In this fashion, a single size head band provides an almost universal fit insofar as the ear pieces will accommodate themselves to the wearer's ears regardless of whether or not they are in precise alignment.

While the invention has been described with particular reference to the illustrated embodiment it will be understood that numerous modifications thereto will appear to those skilled in the art. Although the ear piece has been described in connection with the illustrated headphones obviously it may also be employed to advantage with various other sound devices such as stethoscopes, office transcribing machines, radio equipment and the like.

Having thus described the invention, what I claim and desire to obtain by Letters Patent of the United States is:

1. An ear piece for a headset having a tubular post defining a sound passage, comprising,
 - (a) a unitary body of a soft resilient material,
 - (b) said body being formed with inner and outer concentric tubular walls spaced from one another to define an annular volume therebetween extending from end to end of said body,
 - (c) the inner and outer wall being joined to one another at one end thereof and disconnected at the opposite end,
 - (d) the outside diameter of said body at said one end

being enlarged to fit within the external ear of the wearer and over the ear canal opening, and,

- (e) means mounting the opposite end of said body to the end of said post whereby only a minor portion of said body is telescoped over said post and the major portion of said body extends out from the end of said post to permit angular deformation of said major portion.
2. An ear piece according to claim 1 wherein said walls are of substantially uniform thickness throughout.
3. An ear piece according to claim 1 wherein said one end of said body is of a conical configuration.
4. An ear piece according to claim 1 wherein said inner tubular wall is dimensioned to engage said post.
5. An ear piece according to claim 1 wherein the inner and outer walls are free from one another at the opposite end of said body.
6. An ear piece for a head set having a post, comprising,
 - (a) a unitary body of a soft resilient material,
 - (b) said body being formed with substantially co-extensive inner and outer concentric tubular walls joined at one end and disconnected at the other end and spaced from one another to define an annular volume therebetween,
 - (c) the walls at said one end diverging outwardly to form an enlarged conical end portion,
 - (d) the opposite end of said inner tubular wall being dimensioned to telescopically engage the end of said post whereby a minor portion of said body is telescope over said post with the major portion of said body extending freely outwards from the end of said post.

References Cited by the Examiner

UNITED STATES PATENTS

1,045,812	12/1912	Campbell	181—23
2,458,884	1/1949	Volkman	128—152
2,717,596	9/1955	Knight	128—152
2,803,308	8/1957	DiMattia	181—23
2,888,921	6/1959	Nielson et al.	128—151
2,934,160	4/1960	Touson	181—23
3,123,069	3/1964	Laisne et al.	128—152

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