United States Patent [19]

Krawagna

[11] **3,787,899**

[45] **Jan. 29, 1974**

[54] **EAR MUFF ASSEMBLY**

[75] Inventor: **Alois Albin Krawagna,** Toronto, Ontario, Canada

[73] Assignee: **Imperial Optical Company Ltd., trading as Safety Supply Co.,** Toronto, Ontario, Canada

[22] Filed: **July 11, 1972**

[21] Appl. No.: **270,605**

[52] **U.S. Cl.** ..... **2/209,** 179/182 R, 179/156 R

[51] **Int. Cl.** **A41d 21/00**

[58] **Field of Search** ..... 2/209, 6; 179/156 R, 182 R, 179/156, 182; 181/33 R, 20

[56] **References Cited**

UNITED STATES PATENTS

3,457,376	7/1969	Kreisel et al.	179/182 R
678,170	7/1901	Gardner	179/182 X
817,457	4/1906	Turner	179/156
1,586,391	5/1926	Timmons	179/156
2,501,107	3/1950	Volkmann	179/156
3,272,926	9/1966	Falkenberg	179/182

Primary Examiner—Jordan Franklin
Assistant Examiner—Peter Nerbun
Attorney, Agent, or Firm—Gordon W. Hodson et al.

[57] **ABSTRACT**

An ear muff assembly for use with a headband including an ear cup, a circumferentially extending first bearing, the ear cup being mounted in the first bearing for rotation about a first axis, a yoke, the circumferentially extending bearing being mounted in the yoke for rotation about a second axis which extends laterally of the first axis, the yoke being mountable on the headband.

3 Claims, 4 Drawing Figures

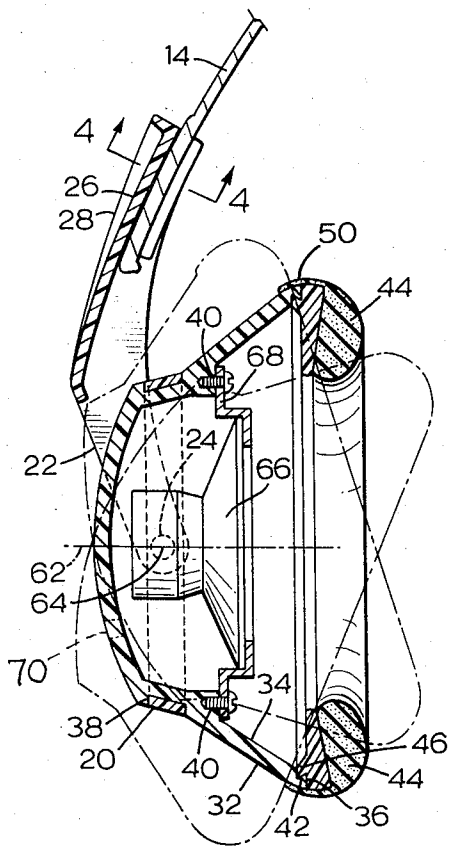
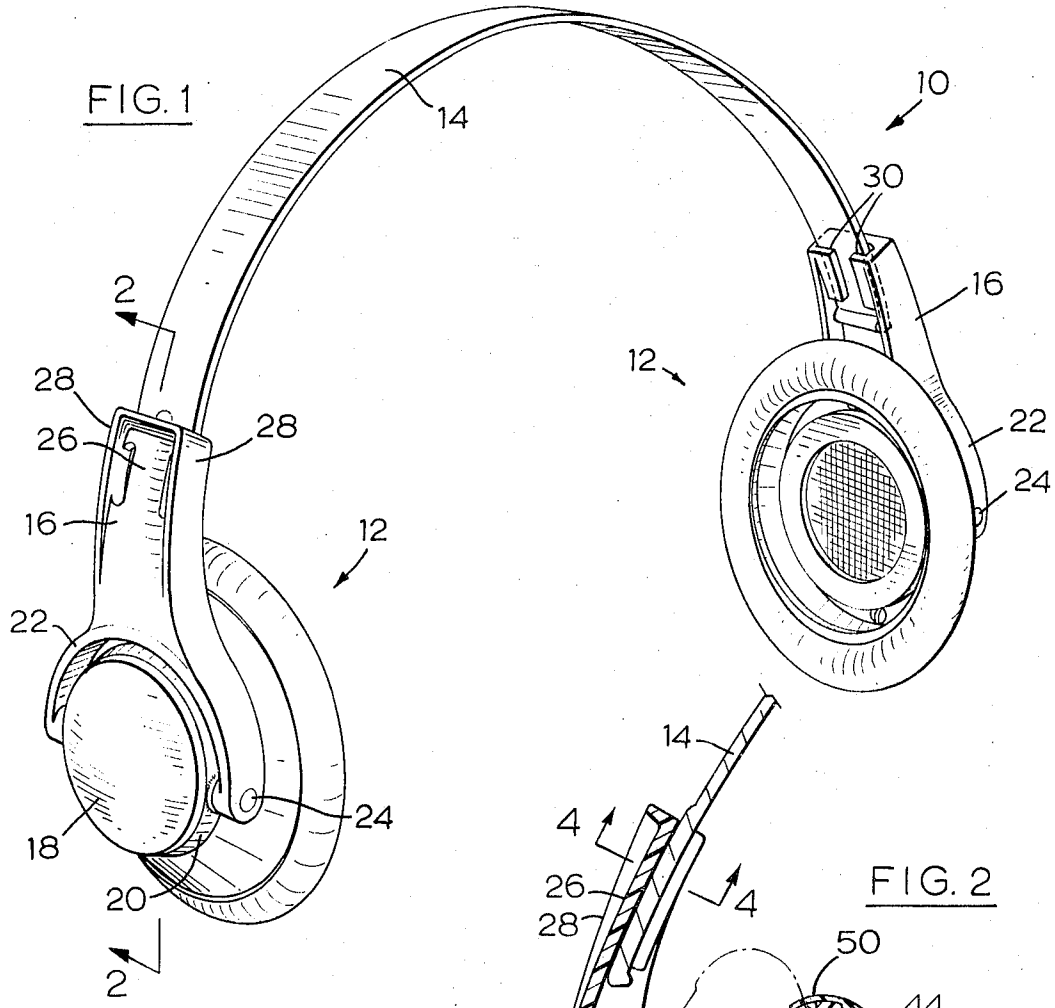


FIG. 1



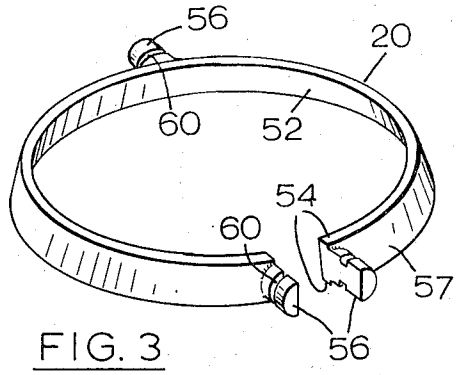


FIG. 3

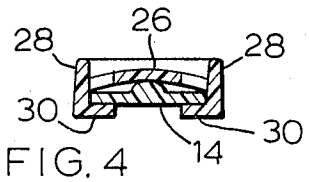


FIG. 4

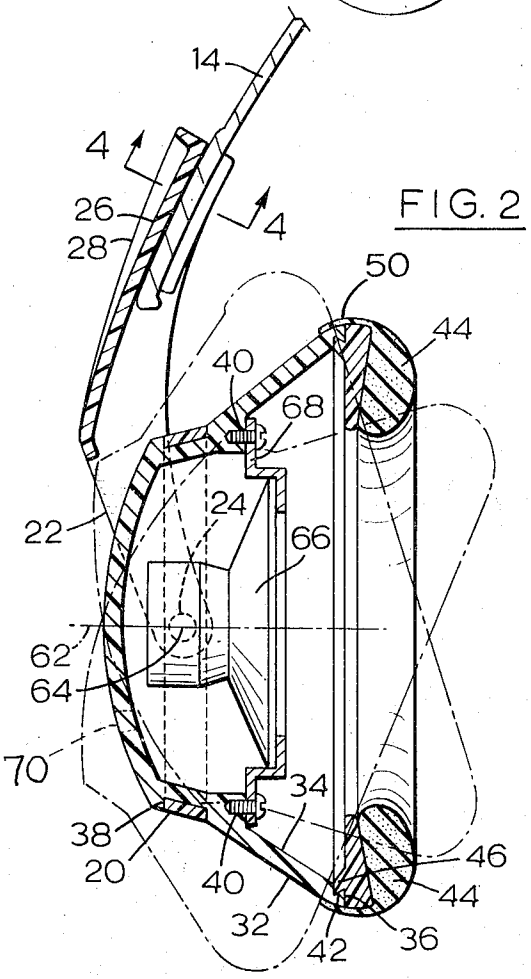


FIG. 2

EAR MUFF ASSEMBLY

FIELD OF INVENTION

This invention relates to ear muff assemblies. In particular, this invention relates to an ear muff assembly for use with a headband wherein the ear muffs are pivotally mounted about two axes without forming passages in the cup to provide the pivotal mounting.

PRIOR ART

Ear muff assemblies such as sound absorbing muffs and head phones are mounted on headbands so as to be positional over the ears of the wearer. Generally, the headband is intended to extend upwardly over the head of the wearer. However, in many applications the wearers prefer to locate the headband in an area remote from the hair, either in front of or behind the head. Where the ear muffs are circular, this presents no problem in that the ear muffs may be positioned at any position relative to the ear. It is, however, frequently desirable to contour the ear muffs so as to fit comfortably over the ears of the wearer and to provide for a mounting of the ear muffs to permit the headband to be moved relative to the ear muffs when being worn. The pivotal mountings which have been provided prior to the present invention employ a mounting screw or pivot pin which extends through the cup and pivotally connected to a support carried by the headband. It has been found that a pivot pin mounted directly in a passage formed in the ear cup decreases the effectiveness of the sound attenuation of the ear muffs by reason of the fact that vibrations established in the headband are transmitted directly to the walls of the ear cup. Furthermore, the assembly of the component parts of the ear muff to include a pivot pin mounted within the ear cup is time consuming.

SUMMARY OF INVENTION

The present invention overcomes the difficulties of the prior art described above by providing an ear muff assembly which is simple in construction and inexpensive to assemble and which provides a pivotal mounting of the ear muff about two axes without requiring a pivot pin extending through the walls of the cup.

According to the embodiment of the present invention, an ear muff assembly for use with the headband includes the improvement of an ear cup, a collar, the ear cup being mounted in the collar for rotation about the first axis extending normal to the ear cup, a yoke for the collar, the collar being mounted in the yoke for rotation about a second axis which extends laterally of the first axis and means for mounting the yoke on a headband.

PREFERRED EMBODIMENT

The invention will be clearly understood after reference to the following detailed specification read in conjunction with the drawings wherein,

FIG. **1** is a pictorial view of an ear muff assembly according to an embodiment of the present invention;

FIG. **2** is a sectional view in the direction of the line **2—2** of FIG. **1**;

FIG. **3** is a pictorial view of a collar according to an embodiment of the present invention; and

FIG. **4** is a sectional view taken along the line **4—4** of FIG. **2**.

With reference to the drawings, the reference numeral **10** refers generally to a head set according to the present invention which includes a pair of ear muff assemblies **12** connected to one another by means of a headband **14.** Each of the ear muff assemblies **12** consists of a yoke **16,** a cup **18** and a collar **20.**

The yoke **16** has a generally U-shaped lower end having a pair of arms **22** formed with axially aligned passages **24.** The upper end of the yoke is formed with a resilient body portion **26** and side walls **28,** each of which have inwardly directed flanges **30** cooperating with the body portion **26** to form a channel for receiving the headband **14.** The headband **14** has a ridge at each outer end thereof which engages the inner edge of the flanges **30** when the yokes are mounted on the headband (FIG. **2**).

Each of the cups **18** has an outer surface **32,** an inner surface **34** and an end face **36.** The outer surface **32** is formed with an annular U-shaped bearing recess **38.** In the embodiment illustrated, the inner surface **34** is formed with a radially projecting face **40** disposed inwardly from the edge **36.** A shallow annular groove **42** extends around the inner face of the cup adjacent the face **36.** An end plate **44** is formed with a shoulder **46** adapted to fit in a close fitting relationship within the groove **42** so as to mount the ring **44** in a position extending over the edge **36** of the cup. A resilient pad **48** is adapted to extend over the face of the plate **44** and has a lip **50** which extends over the adjacent side wall of the plate **44** and the cup **18** so as to be mounted thereon. The collar **20** (FIG. **3**) provides a circumferentially extending first bearing and has an inner surface **52** and a pair of side surfaces **54** adapted to fit in a close fitting sliding relationship within the U-shaped channel **38.** A pair of circular lugs **56** project radially from the outer surface **57** of the collar **20.** One of the lugs **56** is radially split so as to provide a pair of oppositely disposed faces **58.** Each of the lugs **56** is formed with an annular recess **60** disposed inwardly of the end thereof. The lugs **56** are adapted to fit in a close fitting relationship within the passages **24** of the yoke **16.** The annular recess **60** is adapted to receive a small flange formed adjacent the inner end of the passages **24** of the yoke so that the lugs may be retained therein.

The ear muffs are assembled as shown in FIG. **1** of the drawings so that the cup is rotatable about a first axis **62** (FIG. **2**) which extends substantially normal to the head engaging surfaces by rotating the cup relative to the collar **20.** The cup is also rotatable about an axis **64** which extends transversely of the arms of the yoke **16** by rotating the collar relative to the yoke about the lugs **56.** The muff may be rotated about the axis **64** from the normal position shown in FIG. **2,** the two alternative broken line positions also shown in FIG. **2** of the drawings.

In use, the ear muffs may be placed over the ears of the wearer with the headband in any position relative to the ear muffs by reason of the rotation provided by the mounting of the collar on the cup and the ear muffs may be aligned with the head of the wearer by rotation of the muffs about the axis **64.**

An important feature of the present invention is the fact that the pivotal mounting of the cup relative to the headband is provided without mounting any pivot pins in passages extending through the body of the cup. It will be noted that any vibrations picked up by the headband will not be transmitted directly to the cup in view

of the fact that there is no rigid connection between the headband and the wall of the cup. Furthermore, the fact that there are no passages opening through the wall of the cup prevents extraneous vibrations being transmitted to the interior of the cup.

The muffs may be used to either dampen sound or as receiver ear phones. When the muffs are used as ear phones, a speaker **66** is mounted on a face plate **68** which is in turn mounted on the radially extending ledge **40** of the cup. The speaker **66** is disposed within the cup and a through passage **70** (broken lines, FIG. **2**) is formed in the walls of the cup to permit a conductor to communicate with the speaker. In use, the conductor will be sealed within the passage **70** by means of a suitable sealing compound. It will be noted that forming a passage in the wall of the cup to receive a conductor does not have the same deleterious effect on the sound attenuation characteristics as the mounting of a pivot on the cup or in a passage formed through the wall of the cup.

To assemble the ear muff of the present invention, the collar **20** is located in the position extending around the U-shaped channel **38.** The mounting of the collar in the channel **38** is facilitated by splitting at least one of the lugs **56** as shown in FIG. **3** of the drawings. When the collar is in position, the yoke is located over the lugs **56.** The yoke serves to clamp the split sections of the split lug **56** together so as to maintain the collar in a close fitting sliding relationship within the channel **38.** It will be noted that the ear muff assembly may be completed without requiring any hand tools.

From the foregoing, it will be apparent that the present invention provides a simple and inexpensive ear muff assembly for use with teh headband which has the advantage of being pivotable about a pair of axes without the direct mounting of a pivot pin through the wall of the ear cup.

The ear cup collar and yoke may be formed from any of the well known materials used for the manufacture of ear muffs. The construction of the ear muff for the present invention is particularly suitable for moulding in plastic material and may be formed from a plastic material such as LEXAN (trade mark), available from Canadian General Electric Company Limited.

Various modifications of the present invention will be apparent to those skilled in the art without departing from the scope of the invention. For example, the collar **20** may be split along both lugs **56** so this is formed in two parts. It is, however, advantageous to form the collar in one part as it facilitates the assembly of the device.

It will also be understood that the circumferentially extending bearing formed by the collar **20** may also be provided by a pair of arcuately shaped segments, each of which may have a pivot pin formed thereon for engagement with the yoke.

It will be apparent to those skilled in the art that it is not essential to form the circumferentially extending first bearing means to extend around the entire length of the bearing surface of the cup. However, as previously indicated, the split collar has the advantage of being easy to mount and remove as required in use.

What I claim as my invention is:

1. An ear muff assembly comprising

a. a U-shaped head band having a pair of oppositely disposed ends, a transverse ridge projecting inwardly of said U-shaped configuration at each end of said head band, a longitudinal ridge projecting outwardly of said U-shaped configuration at each end of said head band and extending longitudinally thereof,

b. a pair of Y-shaped yoke members each having a leg portion releasably connected at one end to an end of said head band and a pair of arm portions projecting outwardly from the other end of said leg portion, said one end of each leg portion being formed with a U-shaped channel adapted to receive an end of said head band in a close fitting sliding relationship, a pair of flanges projecting inwardly of the U-shaped section of said leg portion and extending longitudinally of said leg portion from said one end of said leg portion, said flanges being spaced from the base of the U-shaped channel a distance which is less than the combined thickness of the head band and the transverse ridge at the end of the band whereby the ends of said head band are releasably locked in said U-shaped channels, said arm portions having transversely extending axially aligned passages formed adjacent the outer ends thereof, said arms being formed to locate said axially aligned passages inwardly of the arc of curvature of said head band,

c. a pair of ear cup members, each having a central axis, an outer surface and an inner surface, said cup members opening inwardly from said head band and being disposed inwardly of said yoke members to be located directly between said yoke members and the head of the wearer in use, a circumferentially extending recessed bearing channel formed in a unitary portion of the outer surface of each of said cup members concentric with respect to said central axis,

d. a bearing collar having a circumferentially extending body portion adapted to fit within said recessed bearing channel of each ear cup in a close fitting sliding relationship whereby said ear cup may be rotated with respect to said bearing collar about said central axis, each of said bearing collars having a pair of diametrically opposed bearing shafts projecting radially from diametrically opposite sides of said body portion, said shafts being mounted for rotation within said transversely extending axially aligned passages of said arms of said yoke member to permit rotation of said ear cups about the axis of said transversely extending passages,

e. said bearing collar being radially split in a plane which extends through said body portion and at least one of said bearing shafts whereby said body portion may be opened to permit location of said collar in said recessed grooves, at least one of said transversely extending passages of said yoke retaining the two portions of a split shaft therein to lock said body portion of said bearing collar within said bearing channel of said ear cup, and

f. said head band and yoke members being rotatable about said central axis of said cup members by rotation of said bearing collar members with respect to said cup members through an angle of at least 120° whereby the head band may be moved from a position overlying the head of the wearer to a position underlying the head of the wearer as required in use.

2. An ear muff assembly comprising

a. a generally U-shaped head band,

b. a pair of Y-shaped yoke members, each having a leg portion connected at one end of said head band and a pair of arms projecting outwardly from the other end of said leg portion, said arms having transversely extending aligned passages formed therein adjacent the outer ends thereof,

c. a pair of ear cup members opening inwardly of said head band and mounted inwardly of said yoke members to be disposed directly between said yoke members and said head band whereby the clamping force of said head band is transmitted directly to said ear cups, said ear cups having a circumferentially extending recessed bearing channel formed in a unitary portion of the outer surface thereof,

d. a bearing collar having a circumferentially extending body portion adapted to fit within said recessed bearing channel of each ear cup in a close fitting sliding relationship whereby said ear cup may be rotated with respect so said bearing collar about said central axis, each of said bearing collars having a pair of diametrically opposed bearing shafts projecting radially from diametrically opposite sides of said body portion, said shafts being mounted for rotation within said transversely extending axially aligned passages of said arms of said yoke member to permit rotation of said ear cups about the axis of said transversely extending passages,

e. said bearing collar being radially split in a plane which extends through said body portion and at least one of said bearing shafts whereby said body portion may be opened to permit location of said collar in said recessed grooves, at least one of said transversely extending passages of said yoke retaining the two portions of a split shaft therein to lock said body portion of said bearing collar within said bearing channel of said ear cup.

3. An ear muff assembly as claimed in claim **2** wherein said arms of said yoke member extend inwardly of the arc of curvature of said head band to dispose said collar member radially inwardly of said arc of curvature of said head band, whereby said head band may be spaced outwardly.

* * * * *