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(54) **EAR PROTECTOR**

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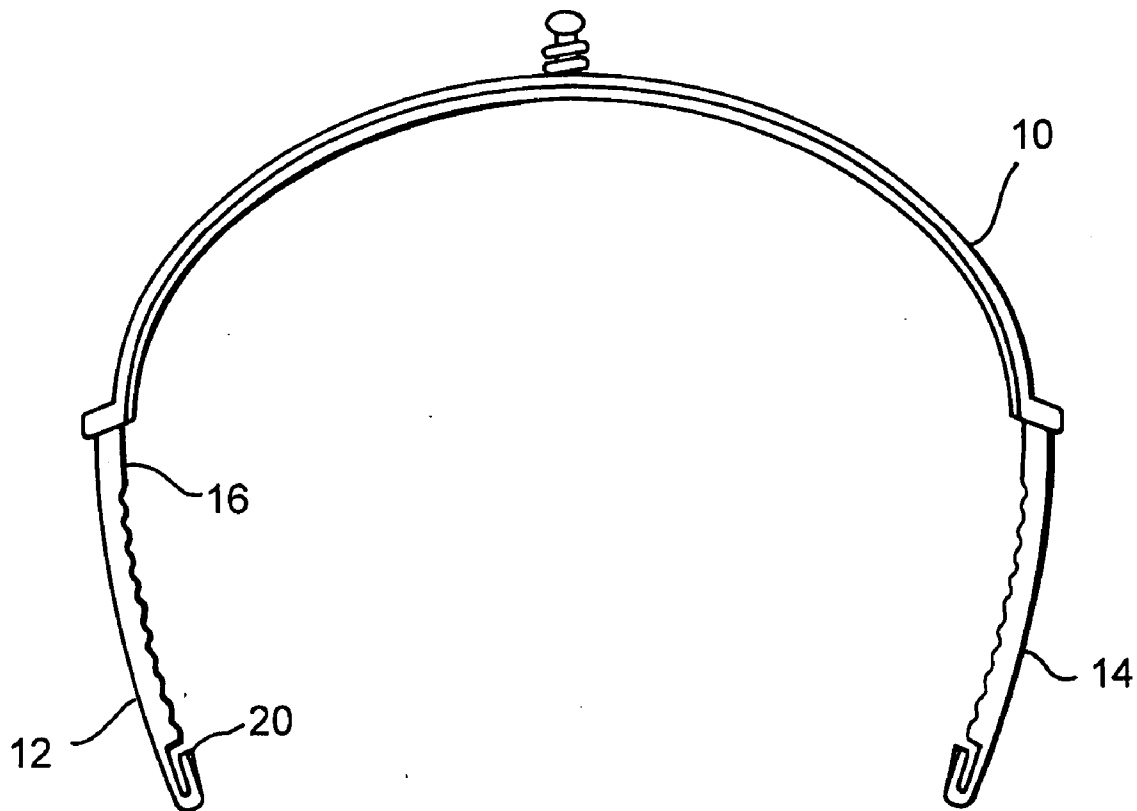
(52) **U.S. Cl.** **2/209**

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(57) **ABSTRACT**

An adjustable ear protector comprising, a U-shaped band having first and second ends wherein the first and second ends are positioned opposite each other on the band; a pair of ear covers; respectively mounted on the first and second ends; and a means for providing tension to the band to secure said ear covers on the ears of a user.

(21) Appl. No.: **10/383,020**



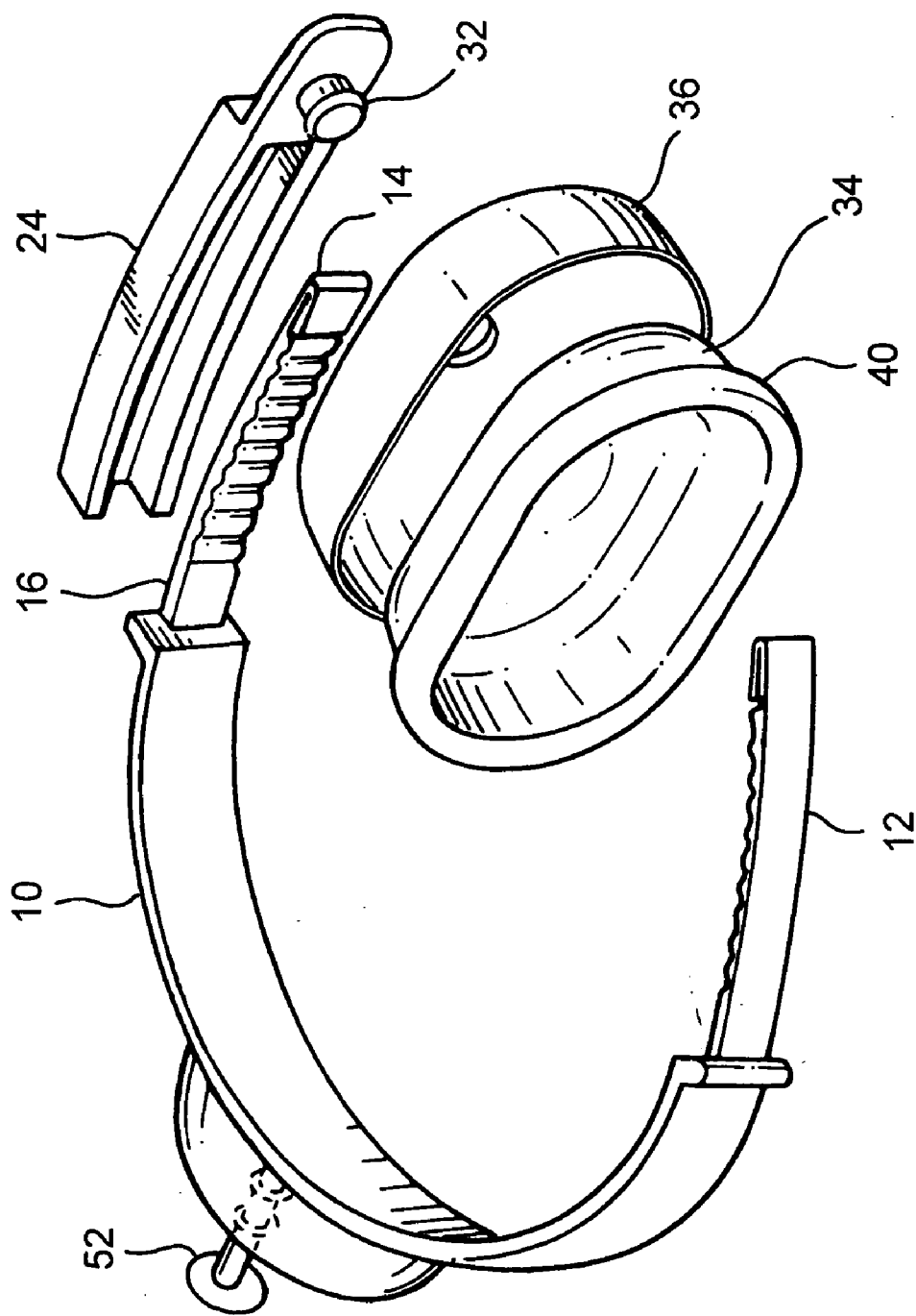


FIG. 1

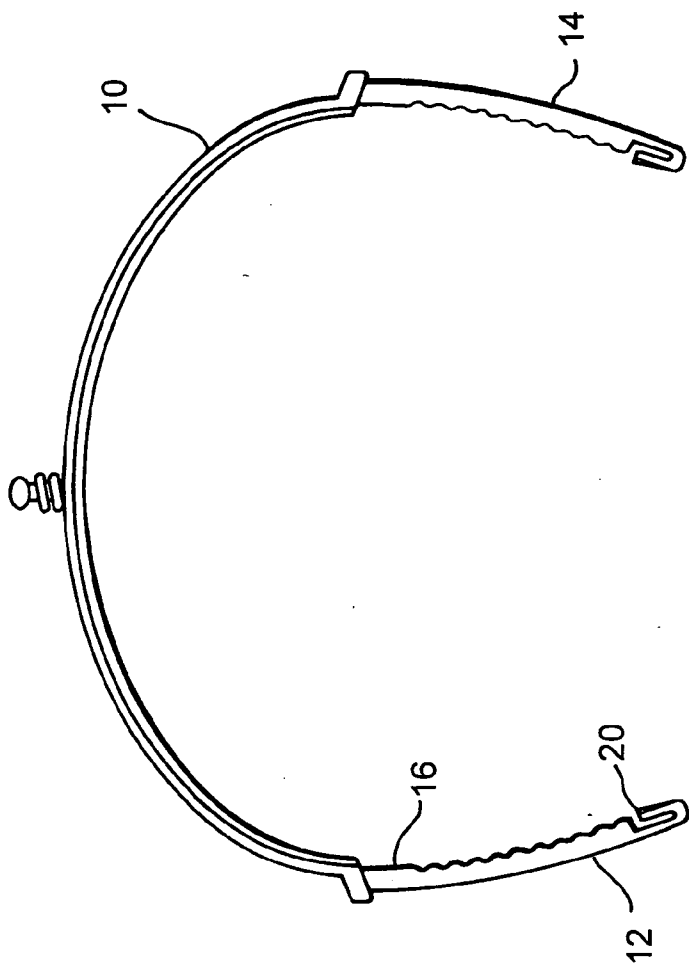


FIG. 2A

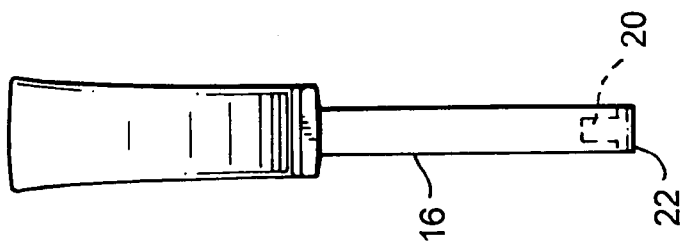


FIG. 2B

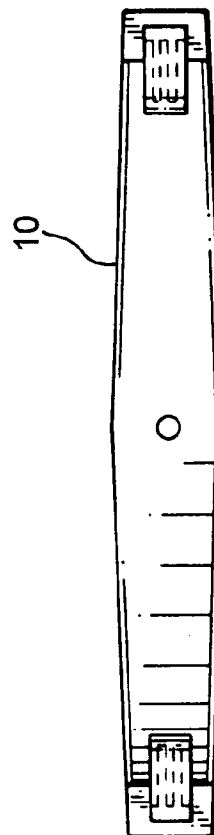


FIG. 2C

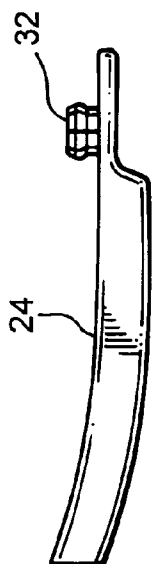


FIG. 3B

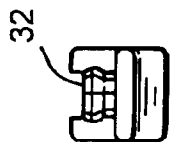


FIG. 3E

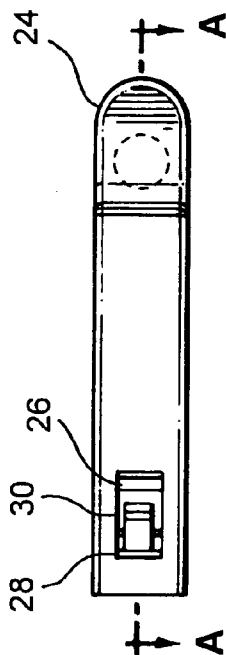


FIG. 3A

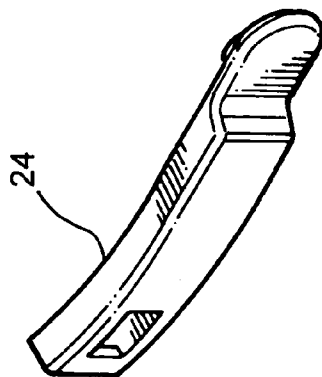


FIG. 3C

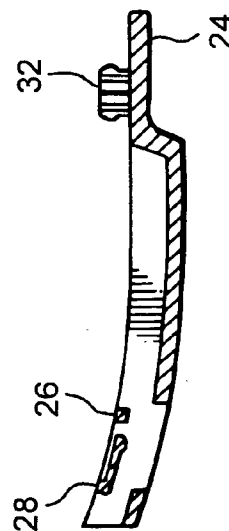


FIG. 3D



FIG. 4B

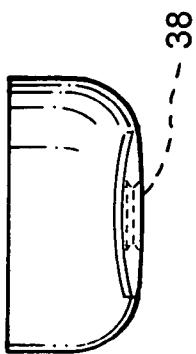


FIG. 4C

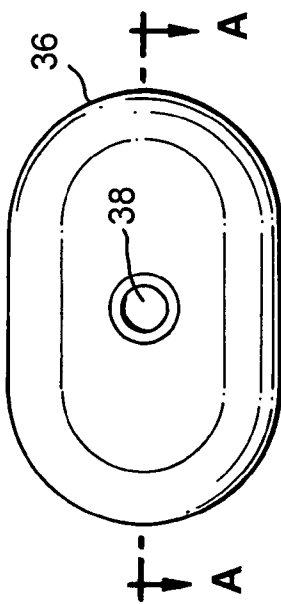


FIG. 4A

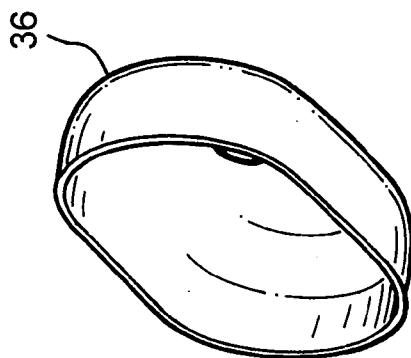


FIG. 4D

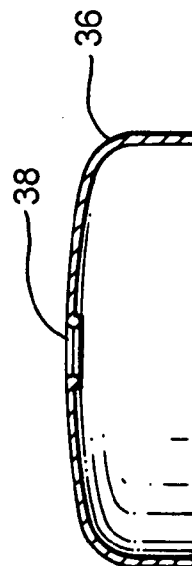


FIG. 4E

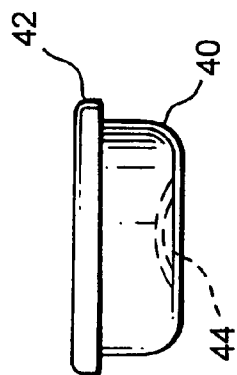


FIG. 5C

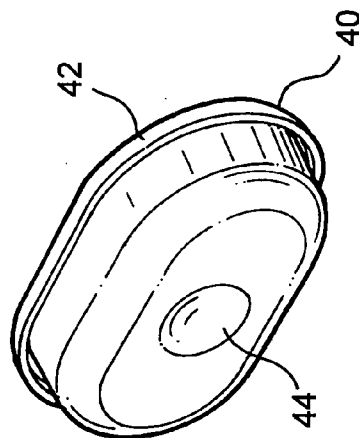


FIG. 5D

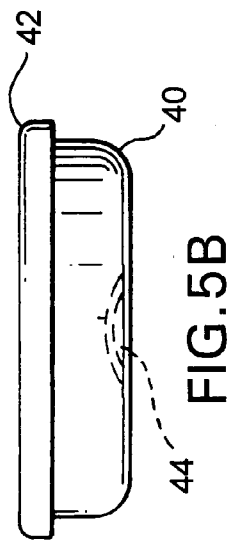


FIG. 5B

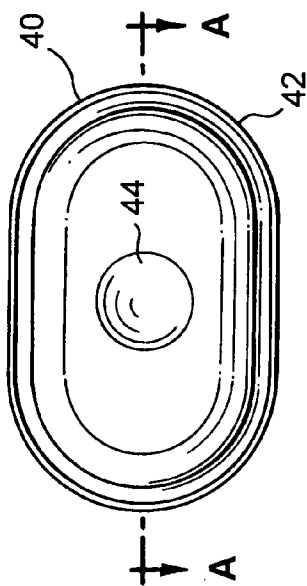


FIG. 5A

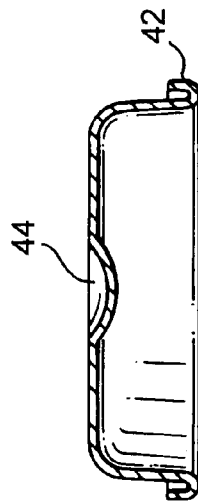


FIG. 5E

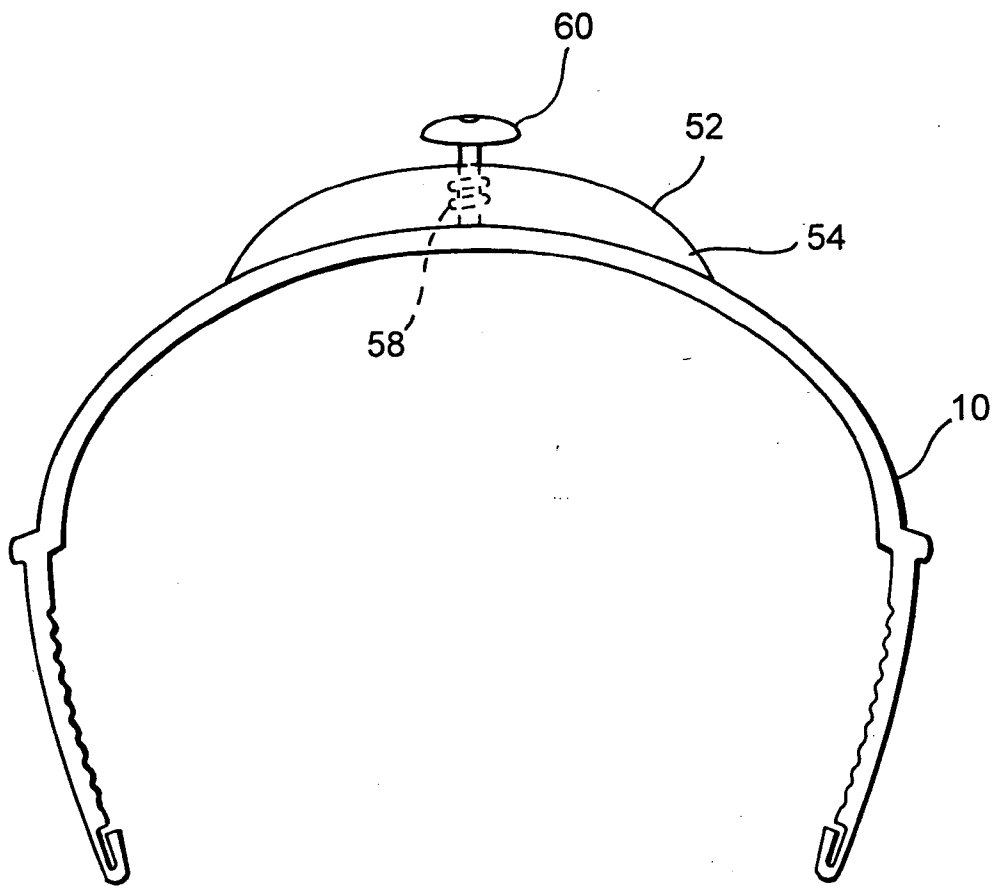


FIG. 6A

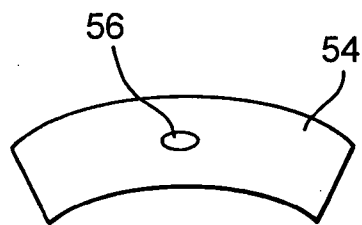


FIG. 6B

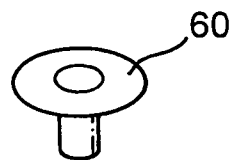


FIG. 6C

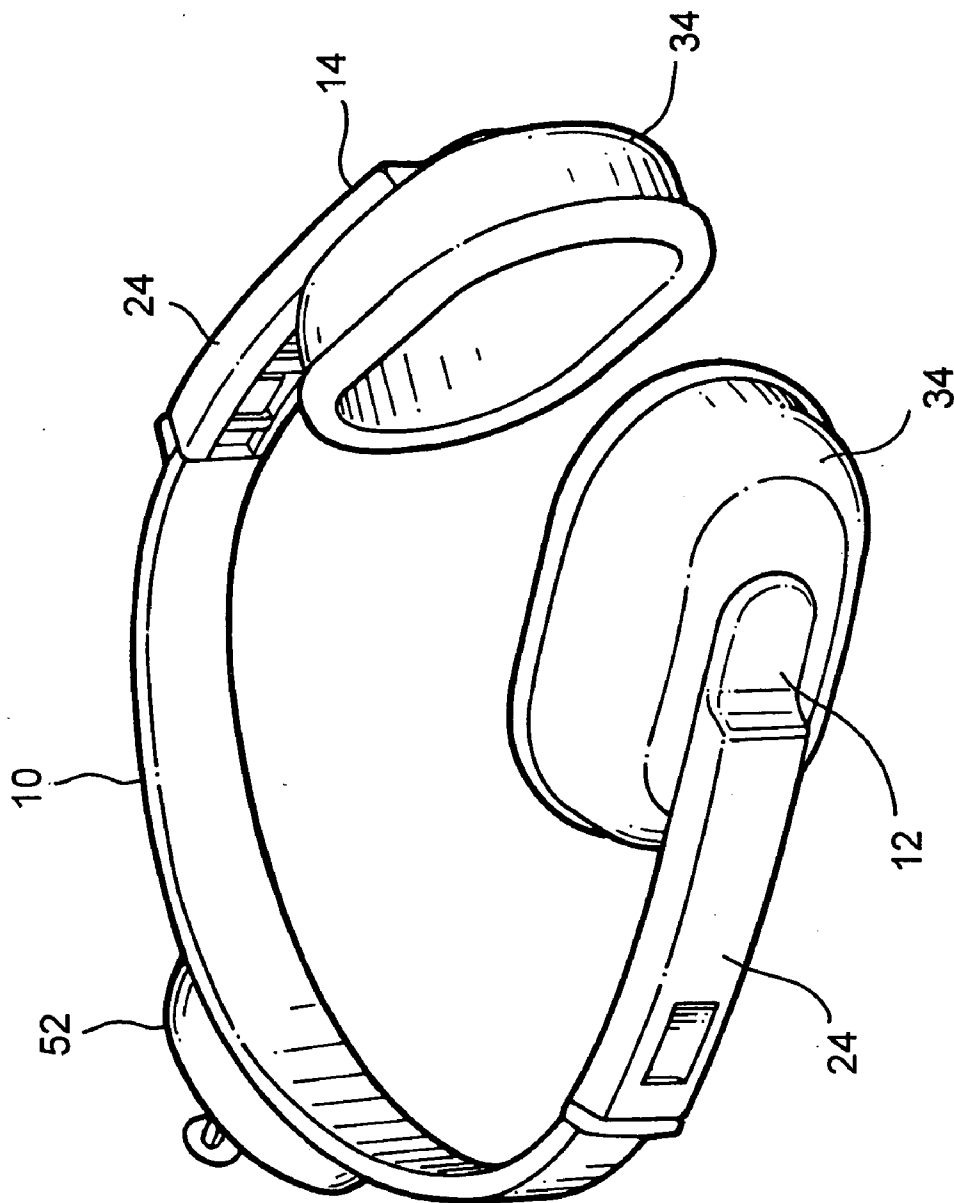


FIG. 7

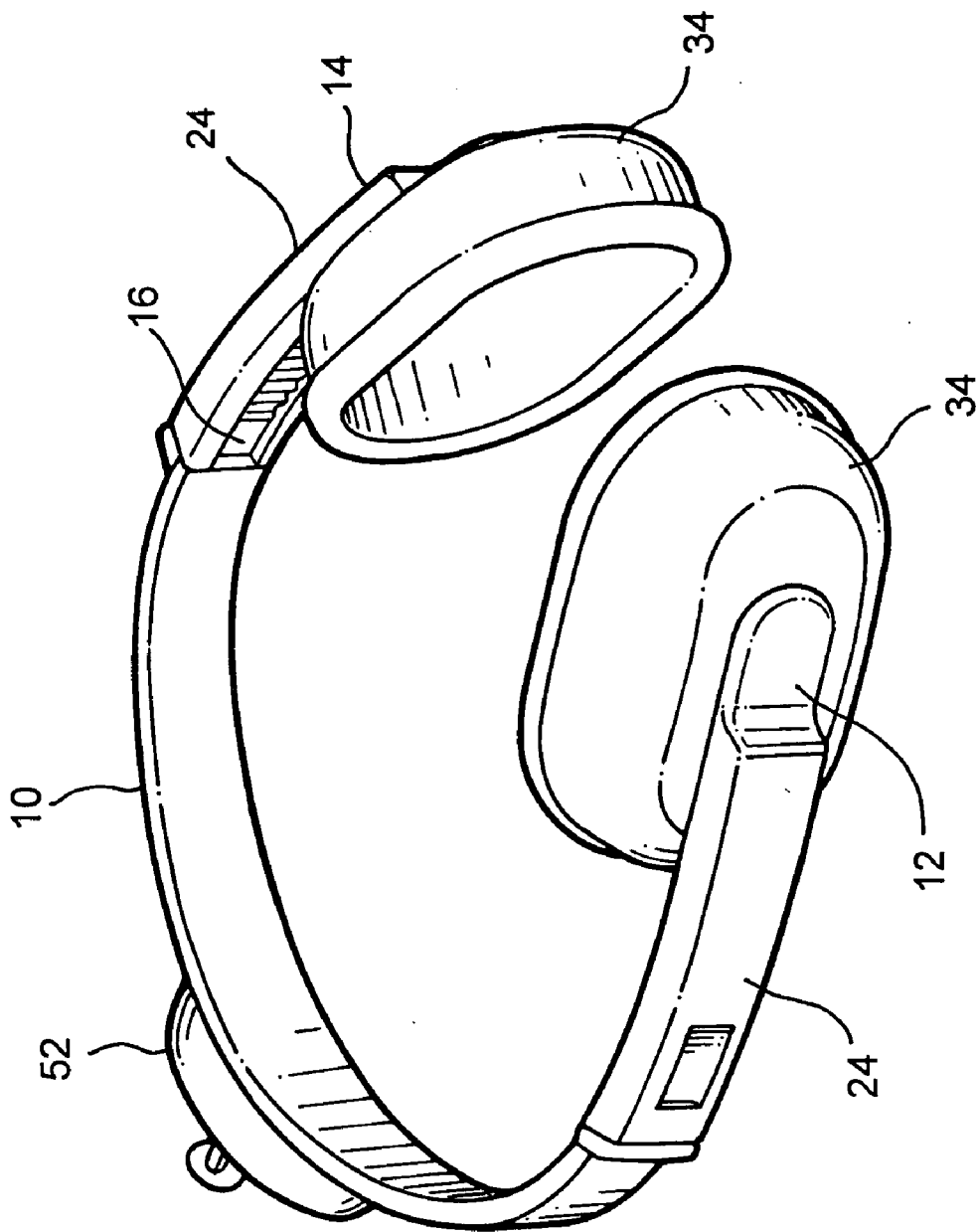


FIG. 8

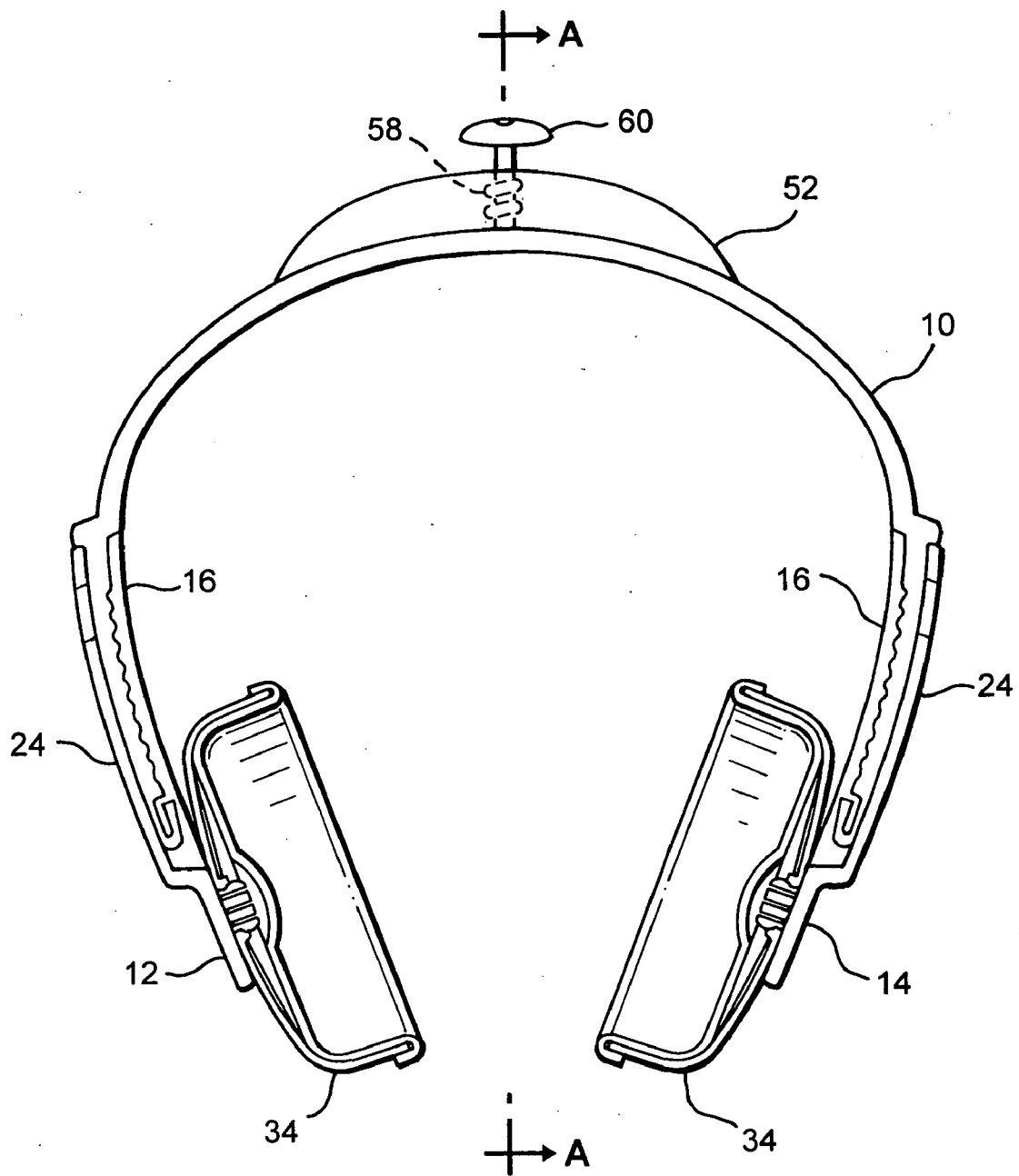


FIG. 9

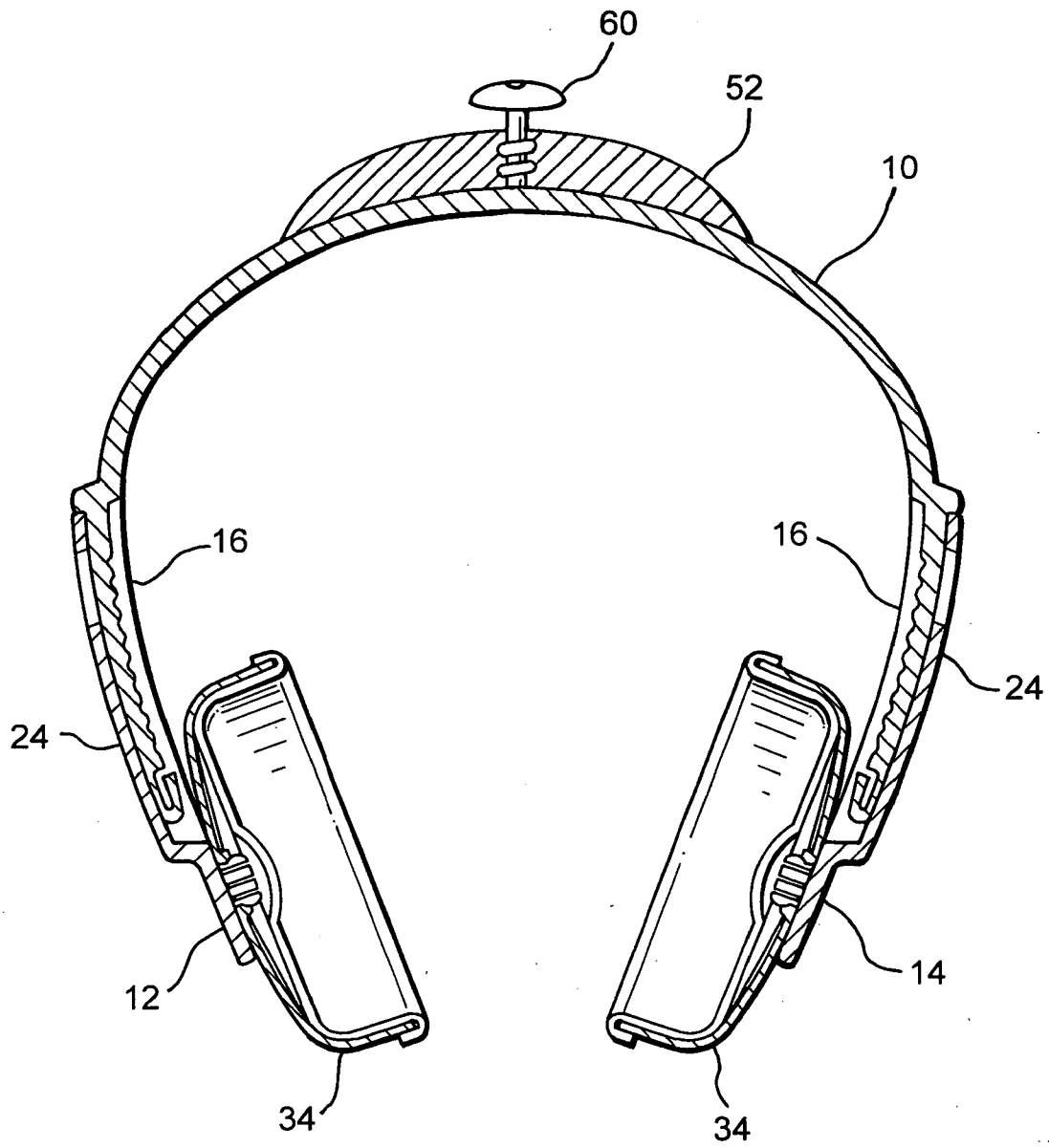


FIG. 10

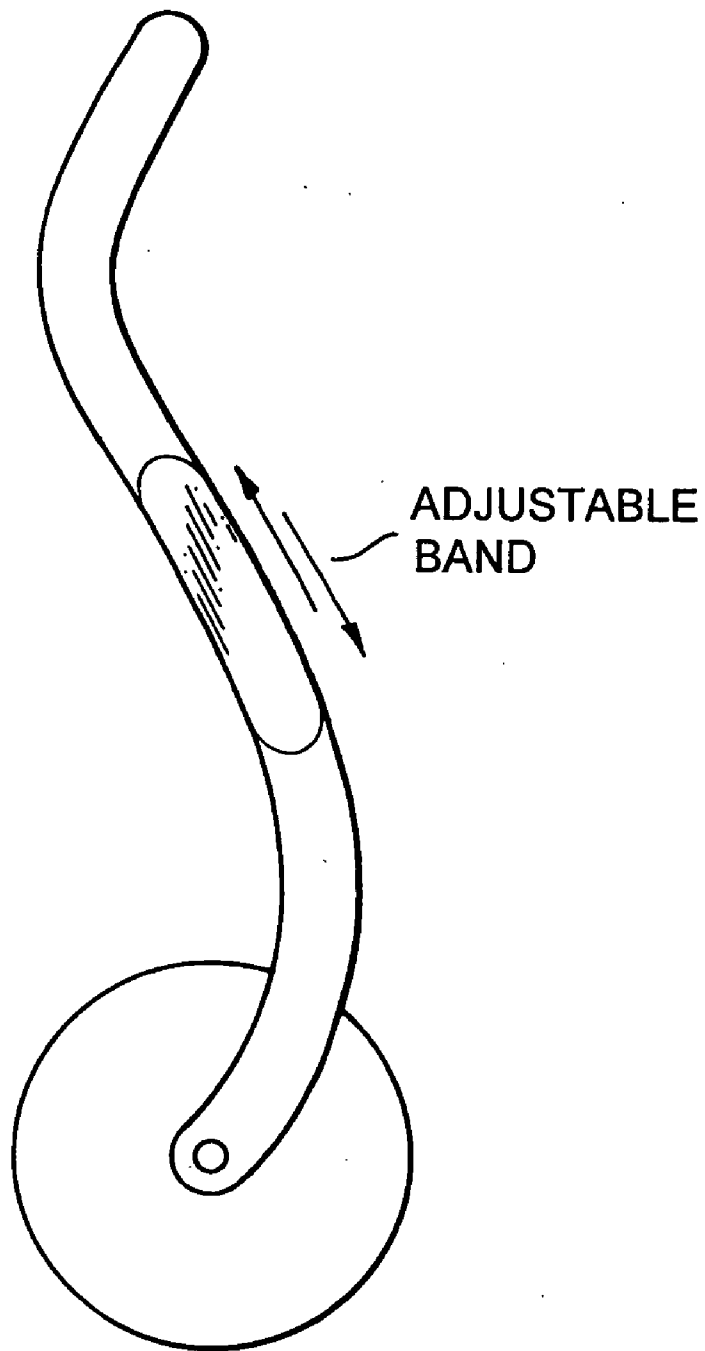


FIG. 11

EAR PROTECTOR

FIELD OF THE INVENTION

[0001] The present invention relates to an ear protector that is easily adjusted and secured without relying on any part of the user's head, neck or chin for support. The ear protector protects the ears of the user from coming in contact with moisture or water and/or other liquid or chemicals.

BACKGROUND OF THE INVENTION

[0002] In general, devices for protecting the ears are known in the prior art. For example, U.S. Pat. No. 2,812,517 to Bogart et al. discloses an ear covering device comprising a U-shaped spring and two ear covers. The ear covers are made of a flexible waterproof fabric. A wire running through the fabric of the ear covers is pulled or drawn over each ear and the ends of the spring slip into pockets on the ear covers. The spring exerts pressure on the tragus portion of the ears to block liquid from entering the ears. This ear covering device is inconvenient in that it requires attaching the ear covers on the ears and then attaching the spring to the ear covers. Furthermore, because the device functions by depressing the tragus portion of the ear, in addition to the ear protector being uncomfortable to wear, if the spring were to lose its tension it would not properly depress the tragus and the ears of the user would not be protected.

[0003] U.S. Pat. No. 6,195,806 to Campbell discloses a device to protect ears while applying heat during hair treatments. The ear protector utilizes ear covers containing an ear engager to urge the earlobes away from the person's scalp. The ear covers are held in position using a U-shaped yoke made of a springy material and the ear protector is supported by the ears of the person. This device thus requires that the lobes of the ears be folded over during operation of the ear protector. The device does not protect the entry of moisture, water or other foreign materials from entering the ears.

[0004] Neither of these patents illustrates an ear protector that can be easily adjusted and secured to the ears while protecting the ears from coming in contact with moisture or water and/or other liquids or chemicals.

[0005] Accordingly, it is the broad object of the present invention to provide an ear protector to prevent accumulation and penetration of moisture or water and/or other liquids or chemicals, into and around the user's ears, which can often cause discomfort and increase the risk of infection and/or pain. The ear protector is completely safe and well suited for hair treatments such as shampooing or hair coloring, but may also be used for bathing, relaxed swimming and other non stressful water sports, or to protect ears from weather conditions.

[0006] A further object of this invention is to provide an ear protector which is easily adjusted to fit the user, i.e. the ear covers and band can vary in size and the band is adjustable.

[0007] It is another object of the present invention to provide an ear protector which can be easily secured. The present invention is comprised of a band that pivots into a desired position within an arc from under the user's chin to behind the user's back. By turning a threaded screw located on the band, tension is provided to the band. In this way, the

ear protector locks into the desired position and is secured to the ears of the user during use. Thus, the ear protector is secured without relying on any part of the user's head, neck or chin for support, making the ear protector of the present invention advantageous over known devices which are neither as secure nor as comfortable to wear.

SUMMARY OF THE INVENTION

[0008] The present invention is an ear protector which is adjustable to fit the user. The ear protector of the present invention protects the ears of the user from making contact with moisture or water and/or other liquids or chemicals. More particularly, the ear protector comprises a U-shaped band having first and second ends. The ends are positioned opposite each other on the band. Mounted on the first and second opposite ends, respectively, is a pair of ear covers. The ear covers are secured on the ears of a user with a means for providing tension to the band.

[0009] Preferably, the U-shaped band is bendable and comprised of a thermoplastic material. The band is positioned behind the user's neck or in the back of the user's head. Alternatively, the band is positioned below the user's chin or in front of the user's head.

[0010] The size of said ear covers vary according to the size of the ears of the user and the ear covers are detachable from the band. In a preferred embodiment, each ear cover is comprised of an outer member which is a rigid or semi-rigid shell and an inner member which is composed of a flexible material, such as a rubber, elastomer, and vinyl, including plastic rubber. The inner member fits within the outer member, conforms to the user's ears, and protects the ears from coming in contact with a substance outside of the ear covers. The inner member is detachable from the outer member. The ear covers may further comprise foam and/or cotton.

[0011] In a preferred embodiment, the means for providing tension to the band is a threaded screw in the center of the band, whereby tension is adjusted by turning the screw. Alternatively, the band can further comprise a concave shaped cover that rests on top of the band and a threaded elongated member that is affixed to the center of the band. The threaded elongated member fits within an aperture on the cover and a knob fits over the threaded elongated member. Tension to the band is adjusted by turning the knob over the threaded elongated member.

[0012] The ear protector of the present invention further comprises means for lengthening and shortening the band to fit the user. Preferably, the means comprises a plurality of grooves on the first and second ends of the band and an additional member for each end. The ear covers are attached to the additional members and the additional members slide along the plurality of grooves to adjust the band to fit the user. In another embodiment that band is in the shape of a wave and the band length is adjustable and rotatable.

[0013] In further embodiment, an antibiotic ointment is applied to the inner member of the ear cover to further protect the ears of the user from infection.

[0014] The invention is also directed to a process for making the ear protector of the present invention by providing a thermoplastic material which is heated to a melted state; providing a mold for producing the thermoplastic

components of the ear protector including a U-shaped band and two outer members for two ear covers; injection molding the thermoplastic material into the mold to produce the thermoplastic components; providing a rubber material which is heated to a melted state; providing a mold for producing the rubber components of the ear protector including two inner members for two ear covers; injection molding rubber material into the mold to produce the rubber components; cooling the thermoplastic and rubber components and assembling the components to make the ear protector.

[0015] Other objects, features and advantages of the present invention will be apparent when the detailed description of the preferred embodiments of the invention are considered with reference to the drawings, which should be construed in an illustrative and not limiting sense as follows:

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] **FIG. 1** illustrates the various component parts of the ear protector of the present invention.

[0017] **FIGS. 2A and 2B** illustrate the U-shaped band.

[0018] **FIG. 2C** is a top view of the U-shaped band.

[0019] **FIGS. 3A** is a top view of the additional member of one end of the band.

[0020] **FIGS. 3B and 3C** are side views of the additional member of one end of the band.

[0021] **FIG. 3D** is a cross-sectional view of the additional member of **FIG. 3A** along the line A-A.

[0022] **FIG. 3E** further details a portion of the additional member.

[0023] **FIG. 4A** is a top view of the outer member of the ear cover.

[0024] **FIGS. 4B, 4C, and 4D** are side views of the outer member of the ear cover.

[0025] **FIG. 4E** is a cross-sectional view of the outer member in **FIG. 4A** along the line A-A.

[0026] **FIG. 5A** is a top view of the inner member of the ear cover.

[0027] **FIGS. 5B, 5C, and 5D** are side views of the inner member of ear cover.

[0028] **FIG. 5E** is a cross-sectional view of the inner member in **FIG. 5A** along the line A-A.

[0029] **FIGS. 6A, 6B, and 6C** illustrate the ear protector with securing means and component parts.

[0030] **FIG. 7** illustrates the ear protector in a compressed position.

[0031] **FIG. 8** illustrates the ear protector in a position extended from the position shown in **FIG. 7**.

[0032] **FIG. 9** is a front view of the ear protector of the present invention.

[0033] **FIG. 10** is a cross-sectional view of the ear protector in **FIG. 9** along the line A-A.

[0034] **FIG. 11** is a side view of another embodiment of the U-shaped band.

DETAILED DESCRIPTION OF THE INVENTION

[0035] The present invention is an adjustable ear protector comprising, a U-shaped band having first and second ends wherein said first and second ends are positioned opposite each other on said band; a pair of ear covers; each ear cover being respectively mounted on said first and second opposite ends, and a means for providing tension to said band to secure said ear covers on the ears of a user. The ear protector is well suited for hair treatments such as shampooing or hair coloring, but may also be used for bathing, swimming and other water sports.

[0036] With further reference to the drawings, **FIG. 1** discloses the various parts of the adjustable ear protector including U-shaped band **10**, having first and second ends **12** and **14**, which are further comprised of plurality of grooves **16** and additional member **24**, a pair of ear covers **34**, and a means **52** for providing tension to the band which shall be further described herein.

[0037] U-shaped band **10**, having first and second ends **12** and **14**, is shown in **FIGS. 1-3**. During operation of the ear protector, ends **12** and **14**, of band **10** provides a natural tension, i.e., the band naturally springs towards the ears of the user. Using a slight amount of force will cause the ends **12** and **14** to spread further apart than when the band is at its resting state, allowing for an increased pressure to assist in holding the ear protector on the ears of the user and to allow the ear protector to fit various head sizes.

[0038] Band **10** is preferably bendable and/or compressible, i.e. it is sufficiently flexible to permit the ear covers to be worn parallel to the user's head. Suitable materials for band **10** include, but are not limited to, plastics, including thermoplastic materials; stainless steel, including heavy gauge stainless steel wire or plastic coated stainless steel, preferably **18/10** stainless steel; aramid, e.g. Kevlar®; carbon fiber composite; graphite fiber composite; other waterproof materials; or a combination of at least two of the above. Most preferably band **10** is comprised of a thermoplastic material. The width and size of the band varies according to the size of the user head e.g. male or female, adult or child, and small, medium, and large head and ear sizes.

[0039] Band **10** does not contact or require support from any part of the head, neck or chin, but rather is free-floating and self-supporting. Band **10** pivots into a desired position within an arc from under the user's chin to behind the user's back. Thus band **10** is positioned behind the user's neck or in the back of the user's head. Alternatively band **10** is positioned below the user's chin or in front of the user's head. In another embodiment, the band is positioned over the top of the user's head. Preferably, the position of the band is based on the user's preference as to comfort, but can also be selected based on the activity of the user or on the user's hair length.

[0040] The ear protector further comprises means for adjusting the ear protector to fit the user. Preferably, as seen in **FIGS. 1-3**, first and second ends **12** and **14** of band **10**, which, as described above, are positioned opposite each other, and are further comprised of a plurality of grooves **16** and additional member **24**. Plurality of grooves **16**, fits into additional member **24** and additional member **24** slides back

and forth along the grooves 16 to adjust the ear protector to the user. Lip 20 on the tip of the distal part 22 of end 12 or 14 catches a first bar 26 on additional member 24 to prevent end 12 or 14 from completely sliding out and detaching from additional member 24. Catch 30 also assists in keeping additional member 24 from detaching from end 12 or 14. A second bar 28 on additional member 24 is spaced apart from first bar 26. First and second bars, 26 and 28 of additional member 24 rest in the plurality of grooves 16.

[0041] FIG. 7 illustrates the ear protector in a compressed position and FIG. 8 illustrates the ear protector in a position extended from the position in FIG. 7.

[0042] Additional member 24 further comprises plug 32 to which an ear cover is attachable and detachable. The ear protector of the present invention is thus further comprised of a pair of ear covers 34, each being respectively mounted on the first and second ends 12 and 14 (See FIG. 1). The ear covers are waterproof and cover the entire ear. The ear covers are detachable from band 10, thus one or both of the ear covers can be changed, as appropriate, to fit the ears of the user. The ear covers should be of a shape to fit the general shape of the user's ear, namely, round, elliptical shaped, or most preferably, rectangular with rounded ends.

[0043] In yet another embodiment, as shown in FIG. 11, the band is in the shape of a wave which has an ergonomic or apex contour and/or roll which conforms to the anatomical shape behind the user's neck or under the user's chin and can be used in combination with foam padding. The band is adjustable and rotatable.

[0044] FIGS. 4 and 5 illustrate the preferred embodiment, wherein each ear cover 34 further comprises an outer and inner member, 36 and 40. FIG. 4 illustrates outer member 36 which is preferably a rigid or semi-rigid shell of plastic, including thermoplastic materials. Suitable materials also include, but are not limited to stainless steel, including heavy gauge stainless steel wire or plastic coated stainless steel, preferably 18/10 stainless steel; aramid, e.g. Kevlar®; carbon fiber composite; graphite fiber composite; other waterproof materials, or a combination of at least two of the above. Plug 32 of additional member 24 fits into aperture 38 of outer member 36 to secure the ear covers on band 10. In this manner, the ear covers are detachable and can be varied, depending the size of the user's ears.

[0045] As illustrated in FIG. 5, inner member 40 is of substantially the same shape as outer member 36 and fits within outer member 36 (see also FIG. 1). Inner member 40 is preferably detachable from outer member 36 and can be changed to accommodate different users. Inner member 40 may optionally further comprise of at least one ridge 42 which overlaps over the edge of the entire circumference of outer member 36 and keeps inner member 40 in place. This creates a very tight seal to prevent moisture or water and/or other liquid or chemicals from making contact with the ears of the user. A greaseless sealer may also be applied to the perimeter of inner member 40. Raised indentation 44 at the bottom center of inner member 40 covers aperture 38 of outer member 36 and assists in keeping plug 32 in place.

[0046] Inner member 40 is composed of a flexible material such as a synthetic rubber, natural rubber, elastomer, or vinyl, including plastic rubber and latex, and preferably plastic rubber. Inner member 40 conforms to the user's ears

to protect the outer and inner ears from coming in contact with a substance outside the ear covers. For further absorption, foam and/or cotton can be inserted into the ear covers. The foam and/or cotton can be either molded to the inner member at the time of manufacture or manually inserted into the inner member at the time of use. It is preferable to use highly absorbent foam that has the capability of absorbing and wicking away water and/or other substances. In another embodiment, the foam and/or cotton is the inner member.

[0047] Inner member 40 should be sterile and can be packaged in sterilized paper or plastic. An antibiotic ointment can also be applied to inner member 40 at the time of use to protect the user from infection, e.g. using a pump spray or aerosol. Alternatively, it can be incorporated into the inner member at the time of manufacture to slowly release onto the user's ears when the ear protector is in use. In a similar manner, waterproofing gel or cream can also be applied at the time of use or at the time of manufacture. After using the ear protector, inner member 40 can be washed and re-used or disposed.

[0048] When the ear protector of the present invention is used for swimming, a small section, e.g. one-half inch, of the inner member may be replaced with a different material with excellent mechanical acoustics for sound transmission, e.g. silicon, plastic or Teflon®. This will ensure safety while using the ear protector by allowing the user to have complete contact with the environment.

[0049] The ear protector of the present invention is also comprised of a means 52 for providing tension to the band to secure the ear covers to the ears of the user (See FIG. 1). Various means for providing tension to the band, such as a screw, pop rivet, snap, Velcro®, or banded perimeter can be used. Preferably, the means for providing tension to the band is a threaded screw in the center of the band wherein the tension is adjusted by turning the screw. Most preferably, and as illustrated in FIG. 6, the means 52 is a concave shaped cover 54 resting on top of band 10 and containing aperture 56. Attached to center of band 10 is a threaded elongated member 58 which slides through and fits within aperture 56. Knob 60, preferably with internal threads, is placed over threaded elongated member 58. Turning knob 60 over the threaded elongated member 58 exerts a force on concave shaped cover 54 and provides tension to band 10. In this way, the ear protector locks into the desired position and is secured during use.

[0050] FIGS. 7 through 10 illustrate different views of the ear protector of the present invention. Different combinations of ear cover and band size can be selected to create the perfect fit for the user, i.e., the ear protector of the present invention can be used for the complete range of head and ear sizes. The ear protector can also be used for pets, for example, when bathing a dog.

[0051] The process for making an ear protector of the present invention comprises providing a thermoplastic material which is heated to a melted state; providing a mold for producing the thermoplastic components of the ear protector including a U-shaped band and two outer members for two ear covers; injection molding said thermoplastic material into said mold to produce said thermoplastic components; providing a rubber material which is heated to a melted state; providing a mold for producing the rubber components of the ear protector including two inner members for two ear

covers; injection molding said rubber material into said mold to produce said rubber components; cooling said thermoplastic and rubber components and assembling said thermoplastic and said rubber components to make the ear protector.

[0052] The invention now being fully described, it will be apparent to one of ordinary skill in the art that many variations and modifications can be made thereto without departing from the spirit or scope of the invention as set forth herein.

- 1. An adjustable ear protector comprising:
 - a U-shaped band having first and second ends wherein said first and second ends are positioned opposite each other on said band;
 - a pair of ear covers; each ear cover being respectively mounted on said first and second ends, and
 - a means for providing tension to said band to secure said ear covers on the ears of a user.
- 2. The ear protector of claim 1 wherein said band is bendable.
- 3. The ear protector of claim 1 wherein said band is comprised of a material selected from the group consisting of plastic, stainless steel, aramid, carbon fiber composite, graphite fiber composite, other waterproof material, and a combination of at least two of the above.
- 4. The ear protector claim 3 wherein the plastic is a thermoplastic material.
- 5. The ear protector of claim 1 wherein said means for providing tension to said band is a threaded screw in the center of said band.
- 6. The ear protector of claim 5 wherein the tension is adjusted by turning said screw.
- 7. The ear protector of claim 1 further comprising a concave shaped cover resting on top of said band and containing an aperture.
- 8. The ear protector of claim 7 further comprising a threaded elongated member which is affixed to the center of said band and fits within said aperture of said concave shaped cover; wherein a knob fits over said threaded elongated member such that tension to the band is adjusted by turning said knob over said threaded elongated member.
- 9. The ear protector of claim 1 wherein said ear covers are detachable from said band.
- 10. The ear protector of claim 1 wherein the size of said ear covers varies according to the size of the ears of the user.
- 11. The ear protector of claim 1 wherein said band is positioned behind the user's neck or in the back of the user's head.
- 12. The ear protector of claim 1 wherein said band is positioned below the user's chin or in front of the user's head.
- 13. The ear protector of claim 1 wherein each ear cover is comprised of an outer member and inner member, wherein said inner member fits within said outer member.
- 14. The ear protector of claim 13 wherein said outer member is a rigid shell or a semi-rigid shell.
- 15. The ear protector of claim 14 wherein said outer member is comprised of a material selected from the group consisting of plastic, stainless steel, aramid, carbon fiber

composite, graphite fiber composite, other waterproof material and a combination of at least two of the above.

- 16. The ear protector of claim 13, wherein said inner member is a flexible material selected from the group consisting of rubber, elastomer and vinyl.
- 17. The ear protector of claim 16 wherein said flexible material is plastic rubber.
- 18. The ear protector of claim 13 wherein said inner member is detachable from said outer member.
- 19. The ear protector of claim 13 wherein said inner member conforms to the user's ears and protects the ears from coming in contact with a substance outside of said ear covers.
- 20. The ear protector of claim 13 wherein the ear covers further comprise an insert within said inner member comprised of foam, cotton or a combination of foam and cotton.
- 21. The ear protector of claim 1 further comprising means for lengthening or shortening said band to fit the user.
- 22. The ear protector of claim 21 wherein said means comprises a plurality of grooves on said first and second ends of said band and an additional member for each end, wherein said ear covers are attached to each of said additional members and said additional members slide along said plurality of grooves to adjust said band to fit the user.
- 23. The ear protector of claim 13 wherein an antibiotic ointment is applied to said inner member to protect the ears of said user from infection.
- 24. An adjustable ear protector comprising:
 - a bendable thermoplastic U-shaped band having first and second ends wherein said first and second ends are positioned opposite each other on said band;
 - a pair of detachable ear covers, each ear cover being respectively mounted on said first and second ends; and
 - a threaded screw in the center of the band to provide tension to said band to secure said ear covers on the ears of a user, wherein the tension is adjusted by turning said screw.
- 25. A process for making an ear protector comprising the steps of:
 - (a) providing a thermoplastic material which is heated to a melted state;
 - (b) providing a mold for producing the thermoplastic components of the ear protector including a U-shaped band and two outer members for two ear covers;
 - (c) injection molding said thermoplastic material into said mold to produce said thermoplastic components;
 - (d) providing a rubber material which is heated to a melted state;
 - (e) providing a mold for producing the rubber components of the ear protector including two inner members for two ear covers;
 - (f) injection molding said rubber material into said mold to produce said rubber components; and
 - (g) cooling said thermoplastic and rubber components and assembling said components to make the ear protector.