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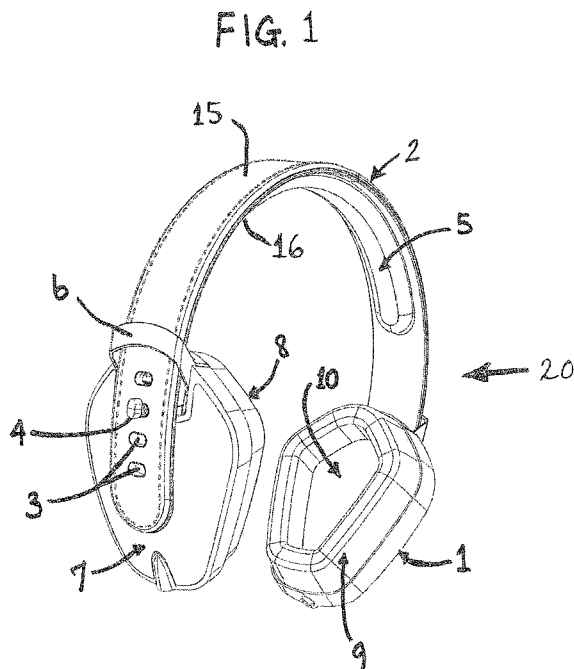
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(54) **Title:** HEADPHONE ASSEMBLY



(57) **Abstract:** A headphone assembly is provided which includes at least one headband and at least one earcup that is removably attached to the headband. The headphone assembly as well as accessory packs can be provided with a plurality of headbands and/or earcups that differ from each other in size, shape, color and/or materials, and are completely interchangeable. As such, a headphone assembly is provided that is completely customizable on demand both before and after purchasing the headphone assembly by simply interchanging the headband and earcups.

HEADPHONE ASSEMBLY

DESCRIPTION

FIELD OF THE INVENTION

The present invention generally relates to a headphone assembly, and more particularly to a headphone assembly having at least one earcup that is removably attached to a headband.

BACKGROUND

Headphones have become increasingly popular in recent years, due to a variety of factors. For example, with the surge in portable device use, accessories such as headphones have become almost essential for use of the device while on the go. Further, as office space designs move towards a more open structure, the demand for headphones to either provide noise cancellation or personal background music or sound has likewise increased.

To meet these needs, headphones have been designed with a variety of end uses in mind. For example, in-ear styles, such as earbuds, have been designed which are lightweight, portable and compact. On-ear styles, and over-the-ear styles have also been designed which provide excellent sound quality as well as the capability of providing noise cancellation. These styles can further be wireless so as to increase their convenience and portability.

While the variety of headphone styles available provide many needed functions, there are drawbacks. Although in-ear styles are convenient and easy to use and transport, they can have somewhat diminished sound quality and generally do not provide noise cancellation features. Further, on-ear and over-the-ear styles can be large and cumbersome to wear and to carry, and are bulky to store when not in use.

To address the problems with on-ear and over-the-ear styles, headphone sets have been developed which can be folded together into a smaller profile. However, while such foldable headphone sets provide improvements, they often have associated cables which can become tan-

gled when the set is folded and unfolded. Further, foldable headsets are generally complicated in design and require a large number of interconnected moving parts. This increases manufacturing time and costs, and also may result in a more delicate and easily breakable product if not folded carefully or properly.

In addition to the above problems, there is also an increasing demand for headphones that allow consumers to accommodate and showcase their individual stylistic tastes and lifestyles. In response, portions of the headphones have been fabricated of a variety of materials such as leather, suede, denim, canvas, silk, metals, plastics, inlaid jewels, fabrics created by fashion designers, recycled materials, and the like. However, such headphone designs are typically pre-designed by the manufacturer with specific materials, colors and prints, and for the consumer to select as already pre-designed, or are customizable for the consumer to pre-design themselves by selecting from a variety of materials, colors and print options. If a consumer decides that they would like something other than the design as purchased, a new headphone set must be purchased.

It would be desirable to have improved headphone assemblies, which provide consumers with excellent sound quality, noise cancellation, comfort, increased portability, and an increased ability to showcase stylistic tastes and lifestyles by allowing the consumer to further customize and alter the headphone assembly on demand.

SUMMARY OF INVENTION

Aspects of the present invention are directed to a headphone assembly including at least one earcup and at least one headband. The headband has an inner surface, an outer surface, a left end and a right end, the inner surface of the headband being in contact with the user's head when the headphone assembly is in use. The earcup has an inner surface and an outer surface, the inner surface of the earcup being in contact with one or more of the user's ears when the headphone assembly is in use. The at least one earcup may include a single left earcup, a single right earcup, multiple left earcups, multiple right earcups, or one or more pairs of left and right earcups, and any combination thereof. The at least one earcup is removably attached to corresponding left and/or right end of the at least one headband through mating connectors disposed on the at least

one earcup and headband. The at least one earcup may be removably attached to left and /or right ends of the headband at varying locations along the ends of the headband so as to provide a customized fit.

In some embodiments, the at least one earcup is removably attached to the left and/or right ends of the headband through mating connectors comprising at least one headband connector disposed on the at least one earcup and at least one earcup connector disposed on the left and/or right end of the headband. According to some embodiments, a single connector is disposed on the earcup and a plurality of connectors are disposed along a length of the left and/or right ends of the headband so as to provide a customized fit and proper placement of the one or more earcups over the ear of a user.

In some embodiments, the at least one earcup is removably attached to the left and/or right ends of the headband via mating connectors disposed along the outer surface of at least one earcup and along the inner surface of the headband. When the at least one earcup is attached to the left and/or right ends of the headband, at least a portion of the outer surface of the at least one earcup is in contact with at least a portion of the inner surface of the headband.

In some embodiments, the mating connectors are selected from at least one protrusion and at least one corresponding aperture. The least one protrusion and at least one aperture are sized and shaped so that the at least one protrusion is movable through the at least one aperture thereby attaching the at least one earcup to the headband. To provide added stability to the earcup/headband attachment, a strap or similar structure may be disposed on the at least one earcup. In particular, the strap or similar structure may be configured so that the ends of the headband pass through the strap so that the ends are at least partially enclosed by the strap. As such, the strap is able to constrict motion of the headband relative to the at least one earcup. The strap can be a rigid structure. The connector can appear like a buckle.

In some embodiments, the at least one protrusion is rotatable along its longitudinal axis. In such embodiments, the protrusion is shaped so as to have a varying cross sectional shape as it rotates. As such, when the protrusion is rotated a particular degree, its shape may be aligned with

that of the aperture so as to allow the protrusion to pass into and out of the aperture. On the other hand, when the protrusion is rotated to other degrees, the shape of the protrusion is such that motion of the protrusion into or out of the aperture is not allowed. As such, the protrusion may be locked within the aperture by rotating the protrusion. For example, the at least one earcup may be attached to the headband by passing the at least one protrusion through the at least one aperture and rotating the at least one protrusion to prevent movement of the at least one protrusion out of the at least one aperture. When desired, the ear cups may be removed from the headband on demand by simply rotating the at least one protrusion to allow movement of the at least one protrusion out of the at least one aperture, and withdrawing the at least one protrusion from the at least one aperture. In some embodiments, the at least one protrusion comprises a spring loaded pin that allows for some motion of the pin toward and away from the inner surface of the earcups.

In some embodiments, the at least one protrusion is disposed extending from the outer surface of the at least one earcup, and the at least one aperture is disposed along the left and/or right ends of the headband. A plurality of apertures may be beneficially disposed along the left end and/or right ends of the headband to allow for attachment of the at least one earcup at varying locations.

In some embodiments, the headband assembly includes at least one earcup selected from an over-the-ear style, an on-ear style, and combinations thereof. The earcups of either the over-the-ear style and on-ear style can further be provided in a variety of sizes, shapes and colors. In some embodiments, one or more portions of the at least one earcup (e.g., outer surface, inner surfaces, and/or sides) can be fabricated of any variety of suitable materials in various colors including, but not limited to, leather, suede, denim, canvas, silk, real or faux fur, fabrics created by fashion designers, recycled materials, jewels/inlaid jewels, metals, plastics, ceramics, wood, magnesium, carbon fiber and combinations thereof.

In some embodiments, the headband assembly includes at least one headband having one or more portions (e.g., outer surface, inner surface, and/or sides) fabricated of any variety of suitable materials in various colors including, but not limited to, leather, suede, denim, canvas, silk,

real and faux fur, fabrics created by fashion designers, recycled materials, jewels/inlaid jewels, metals, plastics, ceramics, wood, magnesium, carbon fiber and combinations thereof.

By providing the at least one earcup to be removably attached to the headband, a variety of earcups and headbands can be interchanged at will to completely customize the headphone assembly. For example, the headphone assembly can be used as either an on-ear or over-the ear style depending on preference. Further, the headband color, size and material can be selected and changed on demand. Still further, the earcup size, shape, color, and material can be selected and changed on demand. In addition, if the headband or earcup of the headphone assembly breaks or undergoes undesirable wear, it is possible to replace only that component without requiring complete replacement of the headphone assembly.

According to some embodiments, a headphone assembly is provided that includes a plurality of interchangeable single earcups or pairs of earcups and at least one headband, wherein the plurality of interchangeable earcups differ from each other in the one or more materials. In some embodiments, the headphone assembly includes a plurality of interchangeable single ear cups or pairs of earcups and at least one headband, wherein the interchangeable earcups differ from each other in size, shape, color, and/or materials.

In some embodiments, a headphone assembly is provided that includes a plurality of interchangeable headbands and at least one earcup, wherein the plurality of interchangeable headbands differ from each other in the one or more materials. In some embodiments, the headphone assembly includes a plurality of interchangeable headbands, wherein the interchangeable headbands differ from each other in size, shape, color and/or materials.

In some embodiments, the headphones are in the form of wired headphones that are connected to a device outputting the sound to the headphones. In other embodiments, the headphones are in the form of wireless headphones.

In some embodiments, the headphones are designed so that the one or more earcups contain all of the components of the audio signal processing unit therein, as well as any additional

circuitry needed, and at least one removable battery. As such, the one or more earcups are completely removable from the headband without requiring disconnection and reconnection of wiring between the earcups and headband.

The present invention further includes headphone kits comprising one or more of the headphone assemblies described herein.

Other aspects, embodiments and advantages of the present invention will become readily apparent to those skilled in the art are discussed below. As will be realized, the present invention is capable of other and different embodiments without departing from the present invention. Thus the following description as well as any drawings appended hereto shall be regarded as being illustrative in nature and not restrictive.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principals of the invention. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present invention. In the drawings, each like component is referenced by a like numeral. For purposes of clarity, every component may not be labeled in every drawing. In the drawings:

FIG. 1 is a perspective view of one embodiment of the headphone assembly of the present invention completely assembled for use, in which a pair of earcups are mounted on the headband with the earcup and headband connectors engaged and in a locked position.

FIGS. 2A-2D are perspective views of one embodiment of the headphone assembly of the present invention showing a headband and a single earcup, in which FIG. 2A illustrates the single earcup completely removed from the headband prior to mounting on the headband, FIG. 2B illustrates the single earcup as it is partially mounted on the headband, FIG. 2C illustrates the

single earcup mounted on the headband with the earcup and headband connectors engaged but in an unlocked position, and FIG. 2D illustrates the single earcup mounted on the headband with the earcup and headband connectors engaged and in a locked position.

FIGS. 3A-3D are top partial views of one embodiment of the headphone assembly of the present invention, in which FIG. 3A illustrates one end of the headband with an earcup mounted and the earcup and headband connectors engaged and in a locked position, FIG. 3B illustrates one end of the headband with an earcup mounted and the earcup and headband connectors engaged and in an unlocked position, FIG. 3C illustrates an earcup, and FIG. 3D illustrates one end of the headband.

FIGS. 4A-4C are various views of one embodiment of the earcup of the present invention having a pin-type headband connector with a stabilizing strap.

FIGS. 5A-5D are various views of one embodiment of the headband of the present invention having an earcup connector in the form of a plurality of openings extending along each end of the headband.

FIGS. 6A-6B show detailed views of one embodiment of the headband assembly of the present invention, in which FIG. 6A illustrates a cross-sectional exploded view of the earcup mounted on the headband with the earcup and headband connectors engaged, and FIG. 6B illustrates an exploded view of the pin-type headband connector of FIG. 6A.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the various figures of the drawing wherein like reference characters refer to like parts, there is shown in FIG. 1, a view of the headphone assembly 20 in accordance with one embodiment of the invention.

As shown in FIG. 1, the headphone assembly 20 includes a headband 2 and a pair of earcups 1 removably attached to opposing ends of the headband 2 via mating connectors 3, 4 disposed on the ear cups 1 and opposing ends of the headband 2. When the headphone assembly 20

is in use, the headband 2 is placed over the top of a user's head with the earcups 1 extending on or over the user's ears.

While the figures depict a headphone assembly 20 which includes a headband 2 and a pair of removably attached earcups 1, it is to be understood that the present invention is not limited to such embodiments. For example, it is possible to provide a headphone assembly 20 that is designed to receive only a single removable earcup 1. For example, DJ headphones and chatting headphones are often specifically designed with only a single earcup provided. As such, in these embodiments, the headphone assembly 20 can include a headband 2 with one or more earcup connectors 3 provided on end thereof, and one or more "left" or "right" earcups 1 with one or more headband connectors 4 provided thereon for removable attachment to the headband 2. In this embodiment, the headband 2 can be worn by a user with the "left" or "right" earcups 1 positioned over either the left or right ear, depending on the user's preference, by simply rotating the headband 2. In addition, while the figures depict a headphone assembly 20 which includes a headband 2 and a pair of removably attached earcups 1, it is also possible to provide a headphone assembly 20 with a pair of earcups 1, in which only one of the earcups 1 is designed so as to be removably attached and the other earcup to be fixed. As such, while the following detailed description is specific to a headphone assembly 20 including at least a pair of removably attached earcups 1, it could likewise be applicable to a single removably attached earcup 1 (or multiple single, e.g., multiple left or right, removably attached earcups 1).

The headband 2 includes an inner surface 16 configured for placement along the user's head when in use, and an opposing outer surface 15. Padding 5 may be disposed at one or more locations along the inner surface 16 of the headband 2 so as to provide added comfort to a user. Such use of padding 5 is well known in the art, and thus, any conventional materials may suitably be used in forming the padding 5 and attaching the padding 5 to the headband 2.

The earcups 1 may be in the form of over-the-ear styles as well as on-ear styles. As shown, the earcups 1 include an inner surface 8 which is in contact with a user's ears when in use, and an opposing outer surface 7. The outer surface 7 is typically fabricated of a material that has some structural integrity so as to protect the contents therein (e.g., audio signal processing

unit components, circuitry, removable battery components and other necessary components). Such materials are known in the art and, as such, any conventional materials may be suitably used to fabricate the outer surface 7. The inner surface 8 is typically fabricated of a material that provides comfort to a user's ears which engage the inner surface. Such materials are also known in the art and, as such, any conventional materials may be suitably used to fabricate the inner surface 8. As shown, a cushion 9 may be provided on the inner surface 8 which is sized and configured to surround a user's ears if the earcups 1 are an over-the-ear style, or sized and configured for positioning on a user's ears if the earcups 1 are an on-ear style. If the earcups 1 are an over-the-ear style, then a recess 10 is typically provided within the interior of the cushion 9 in which the ears can be completely contained. If the earcups 1 are an on-ear style, then a mesh or similar material (not shown) may extend over the recess 10 to provide a flush or relatively flush inner surface 8 in contact with the users' ears. These general features of the earcups 1 are well-known in the art, and thus, the general features of the earcups 1 may be in accordance with such conventional structures.

The headphone assembly 20 can have either a wired or wireless headphone design. Both wired and wireless headphone designs are well known. As such, the audio signal processing unit components, circuitry, removable battery components and other necessary components to provide sound as well as noise cancellation in the present headphone assembly 20 may be in accordance with conventional designs. Thus, these components will not be described in detail herein.

In some embodiments, the headphone assembly 20 is designed so that the earcups 1 contain all of the components of the audio signal processing unit therein, as well as any additional circuitry needed. As such, the earcups 1 are completely removable from the headband 2 without the added complication of connecting and disconnecting wiring that often connects the earcups 1 to each other through the headband 2. Further, the earcups 1 may have a rechargeable battery contained therein so that the earcups 1 alone contain all the necessary components to provide sound as well as noise cancellation to the headphone assembly 20.

FIGS. 2A-2D illustrate one example of how an earcup 1 may be mounted and attached to the headband 2 and removed completely from the headband 2. As shown, opposing left and right

ends 13, 14 of the headband 2 are provided with at least one earcup connector 3 (of course, in single earcup 1 designs, it is possible to only provide the at least one earcup connector 3 on a single end of the headband 2), for example at least one aperture 3 passing through the thickness of the headband 2. As shown, a plurality of earcup connectors 3 can be located along a length of the left and right ends 13, 14 of the headband 2 and spaced apart so as to allow for attachment of the earcups 1 at various locations along the headband 2. If desired one end 13, 14 of the headband 2 can be provided with a plurality of earcup connectors 3, while the other end 13, 14 can be provided with a single earcup connector 3. As such, a user can be provided with a proper fit of the headphone assembly 20 with the earcups 1 properly positioned on or over the ears. As further shown, the earcup 1 is provided with at least one headband connector 4, for example at least one protrusion disposed on the outer surface 7 of the earcup 1 and which is sized, shaped, and positioned so as to pass through the one or more apertures in the headband 2. As shown in the exemplary embodiment in the figures, the earcup 1 is provided with a single headband connector 4 in the form of a protrusion so as to pass through any one of the earcup connectors 2 in the form of apertures in the headband 2, so as to provide a customized fit.

If desired, the earcup 1 may further be provided with an additional support, such as a strap 6 or other suitable structure, to provide a more secure and stable connection between the earcup 1 and the headband 2. This may be particularly beneficial if the ear cup connector 3 and headband connector 4 have a mating connection along a single point, such as between a protrusion passing through a single aperture, or along a localized area which can result in movement or rotation between the earcup 1 and headband 2 when connected. As shown in FIGS. 2A-D, the strap 6 or other structure can be configured so that the left or right end 13, 14 of the headband 2 passes through the strap 6 with the left or right end 13, 14 of the headband 2 at least partially enclosed and constricted by the strap 6. As shown by the embodiment of FIGS. 2A-2D, the strap 6 or other structure may be configured so as to limit motion of the earcup 1 in a left or right direction with respect to the length of the left or right end 13, 14 of the headband as well as to limit rotation of the earcup 1 along the mating connection (e.g., rotation along the mating connection between the aperture and protrusion).

As shown in the embodiment of FIG. 2A, the earcup 1 is completely detached from the headband 2. In order to mount the earcup 1, the left end 13 of the headband 2 is passed through the strap 6 and along the outer surface 7 of the earcup 1 (e.g. by moving the earcup 1 along the direction of the arrow). As shown in FIG. 2B, as the left end 13 of the headband 2 passes through the strap 6, the earcup 1 is angled with its outer surface 7 angled away from the inner surface 16 of the headband 2 to accommodate the headband connector 4 (protrusion). Once the headband connector 4 (protrusion) on the earcup 1 is aligned with the earcup connector 3 (aperture), the outer surface 7 of the earcup 1 is brought towards the inner surface 16 of the headband 2 so that the earcup connector 3 mates with the headband connector 4 (e.g., the protrusion is pushed through the aperture), with the result being depicted in FIG. 2C. Next, the connection between the earcup connector 3 and headband connector 4 is fixed so as to lock the earcup 1 in place on the headband 2 as depicted in FIG. 2D.

For example, according to an exemplary embodiment as shown in FIGS. 2A-2D and 3A-3D, the headband connector 4 can be in the form of a rotating pin having a cross sectional shape relative to the headband 2 that varies depending on the point of rotation. In particular, the rotating pin has a length extending from the outer surface 7 of the earcup 1 such that the rotating pin is rotatable along its longitudinal axis. As such, when the pin is in a first position (rotated to a particular degree, as shown in FIGS. 2A-2C and 3B) the pin shape aligns with and corresponds to the aperture so as to fit within and pass through as well as be withdrawn from the aperture. On the other hand, when the pin is rotated to other degrees (e.g., as shown in FIGS. 2D and 3A), the pin shape no longer corresponds to the aperture and, thus, is prevented from passing through the aperture or being withdrawn from the aperture if already previously locked within the aperture. Thus, for example, the earcups 1 may be attached to the headband 2 by passing the rotating pin through an aperture and rotating the pin to prevent movement of the pin out of the aperture, thereby locking the earcup 1 in place. When desired, the earcups 1 may be removed from the headband 2 on demand by simply rotating the pin to allow movement of the pin out of the aperture, and withdrawing the pin from the aperture.

For example, according to some examples, such as those shown in the FIGURES, the headband connector can be a turning lock device.

While the figures generally depict the earcup connector 3 as including a plurality of apertures, and the headband connector 4 as including a single protrusion that fits within the apertures, the present invention is not limited to such configurations. For example, the headband connector 4 could include a plurality of protrusions, and the earcup connector 3 could include one aperture or a plurality of apertures. In addition, any known mating connectors could suitably be used in place of the protrusions and apertures, which allow for removable attachment of a first structure along a flush or somewhat curved surface (along the surface of the earcups) to a second structure along a correspondingly flush or somewhat curved surface (along the surface of the headband). Some other examples include, but are not limited to, press fittings, one or more threaded screws, one or more protrusions or pins extending from the earcups 1 having a lower portion and an upper portion connected to the lower portion via a hinge to allow for rotation of the upper portion downwards (e.g., to form an upside-down L-shaped pin) to lock the earcup 1 and headband 2 together, and the like. Such connectors could not only include connection of the first and second structures along a single or localized small surface (e.g., such as along the single rotating pin via an aperture), but may also include connection of the first and second structures along a greater length or surface area of each of the first and second structures (e.g., such as through a recessed groove in one surface and a corresponding protrusion that slides within the groove to thereby connect the two first and second structures along a line or other configuration, or the like).

FIGS. 4A-4C show detailed views of an earcup 1 according to embodiments of the invention. As previously described, the earcup 1 is provided with an inner surface 8 that comes into contact with a user's ears, and an outer surface 7 on which one or more headband connectors 4 are disposed. The earcups 1 are depicted as having a generally elongate rounded shape with a wider upper portion and a more narrow lower portion, so as to generally correspond to the shape of an ear which is likewise wider at the top and narrower at the bottom. However, any variety of earcup 1 shapes could alternatively be used, including other conventional geometric earcup 1 shapes such as circles and ovals, as well as a variety of novelty shapes (e.g., stars, hearts, etc.) that may appeal to a variety of consumers' stylistic tastes.

FIGS. 5A-5D show detailed views of a headband 2 according to embodiments of the invention. As shown, the headband 2 is generally a u-shaped headband that corresponds to the outer profile of a user's head. Padding 5 can be provided along the inner surface 16 of the headband 2 for enhanced comfort. Padding 5 can further be provided along one or more locations of the inner surface 16 that come into contact with the earcups 1, such as the left and/or right ends 13, 14 of the headband 2. Such padding can beneficially prevent scratching and damage to the outer surface 7 of the earcups 1 and the inner surface 16 of the headband 2. While the headband 2 is depicted as having a uniform thickness along its length, the present invention is not limited to such configurations. For example, the headband 2 can be provided with a variety of novelty shapes that may appeal to a variety of consumer stylistic tastes. Some examples include, but are not limited to, varying thicknesses along one or more portions of the headband 2 (e.g., a thicker middle portion with tapered ends), varying design shapes along the length of the headband 2 (e.g., a zig-zag shape, interlocking rings, and the like), and double or multiple interconnected narrow headbands with gaps therebetween forming a single headband 2.

In addition to the various sizes, shapes, and design possibilities for both the earcups 1 and headbands 2 as described above, the present invention further provides earcups 1 and headbands 2 that are fabricated of a wide range of materials and colors to allow for further customization on demand. For example, one or more portions of the earcups 1 (e.g., outer surface, inner surface, and/or edges) can be fabricated of any variety of suitable materials in various colors including, but not limited to, leather, suede, denim, canvas, silk, real or faux fur, fabrics created by fashion designers, recycled materials, jewels/inlaid jewels, metals, plastics, ceramics, wood, magnesium, carbon fiber and combinations thereof.

Likewise, one or more portions of the headband 2 (e.g., outer and/or inner surface) can be fabricated of any variety of suitable materials in various colors including, but not limited to, leather, suede, denim, canvas, silk, real and faux fur, fabrics created by fashion designers, recycled materials, jewels/inlaid jewels, metals, plastics, ceramics, wood, magnesium, carbon fiber and combinations thereof.

By providing the earcups 1 to be removably attached to the headband 2, a variety of earcups 1 and headbands 2 can be interchanged on demand to provide a completely customizable

headphone assembly 20 upon purchase and after use. For example, the headphone assembly 20 can be used as either an on-ear or over-the-ear style depending on preference by simply attaching the desired style of earcups 1. Further, the headband 2 color, size, shape, and materials can be selected and changed on demand. Still further, the earcup 1 size, shape, colors, and materials can be selected and changed on demand. In addition, if a component of the headphone assembly 20 breaks down or undergoes undesirable wear, one can simply replace only that component without requiring complete replacement of the headphone assembly 20.

According to some embodiments, a headphone assembly 20 can be provided so as to include a plurality of interchangeable earcups 1 or pairs of earcups 1 and at least one headband 2. In such embodiments, the plurality of interchangeable earcups 1 can differ from each other in the one or more materials used on forming the earcups 1, the size of the earcups 1, the shapes of the earcups 1, and the colors of the earcups 1. As such, a user can modify the style of the headphone assembly 20 on demand by simply changing the earcups 1.

In some embodiments, a headphone assembly 20 can be provided with a plurality of interchangeable headbands 2 and at least one earcup 1 or pair of earcups 1. In such embodiments, the plurality of interchangeable headbands 2 can differ from each other in the one or more materials used on forming the headbands 2, the size of the headbands 2, the shapes of the headbands 2, and the colors of the headbands 2. As such, a user can modify the style of the headphone assembly 20 on demand by simply changing the headbands 2.

According to the embodiments of the invention, it is further possible to provide a headphone assembly 20 that includes multiple interchangeable earcups 1 or pairs of interchangeable earcups 1 and headbands 2, each of which can differ from each other in the one or more materials, the size, the shapes, and colors used in forming the multiple earcups 1 and multiple headbands 2. This can allow for further customization options for a user.

According to all of the embodiments described herein, the headbands 2 and earcups 1 according to the invention are all provided with mating connectors that allow each of the headbands 2 and each of the earcups 1 to be completely interchangeable in a given headphone assem-

bly 20 and among other headphone assemblies 20. Further, it is possible to provide separate accessory packs, for example, individual earcups 1 or multi-packs of earcups 1, individual headbands 2 or multi-packs of headbands 2, that can be provided independent of the headphone assemblies 20. As such, earcups 1 and headbands 2 can independently be purchased by a user to use with any given headphone assembly 20 that the user already owns, to allow for further customization after or at the same time that an initial headphone assembly 20 is purchased.

The present invention further includes headphone kits comprising one or more of the headphone assemblies described herein.

FIGS. 6A-6B show detailed views of an embodiment of the earcup connector 3 and headband connector 4 in the form of a rotatable pin 11 disposed on the outer surface 7 of each earcup 1, where each rotating pin 11 passes through and engages an earcup connector (aperture) 3 disposed within the headband 2. In particular, one or more earcup connectors (apertures) 3 may be disposed in the headband 2 at the left and/or right ends 13, 14 of the headband 2, particularly in positions near the left and/or right ends 13, 14 of the headband 2 such that when the rotatable pin 11 passes through a respective one of the one or more earcup connectors (apertures) 3, the earcups 1 are positioned at a user's ears, one on the left ear, and/or one on the right ear. As previously described in connection with FIGS. 2A-D and 3A-B, the rotatable pin 11 can be rotated so as to be passable through the earcup connectors (apertures) 3 or so as to not be passable through the earcup connectors (apertures) 3, thus providing a locked and unlocked state. In FIGS. 6A-6B, the pin 11 is further shown in connection with a spring 12. As such, the pin 11 is provided with some allowable motion upwards and downwards relative to the upper surface 7 of the earcups 1 as depicted by the arrows in FIG. 6A. Such upwards and downward motion is beneficial in that it can allow for some flexibility of the earcups 1 in relation to a user's ears when the headphone assembly 20 is in use. For example, while the headband 2 can be fabricated of materials that allow for some flexibility and enhanced comfort to a user, the spring 12 feature can further increase the comfort and fit of the earcups 1 on a user's ears by allowing for further motion of the earcups 1 towards and away from a user's ears when the headphone assembly is in use.

It will be apparent to those skilled in the art that various modifications and variations can be made to the structure of the present invention without departing from the scope or spirit of the invention.

In view of the foregoing, it is intended that the present invention cover modifications and variations of this invention provided they fall within the scope of the following claims and their equivalents.

CLAIMS

What is claimed is:

1. A headphone assembly comprising:

at least one headband having an inner surface, an outer surface, a left end and a right end;
at least one earcup, the at least one earcup having an inner surface and an outer surface;

and

the at least one earcup being removably attached to the left end and/or right end of the headband via mating connectors disposed on the at least one earcup and headband.

2. The headphone assembly of claim 1, wherein the at least one earcup completely houses audio signal processing unit components and circuitry for providing sound and/or noise cancellation.

3. The headphone assembly of any one of the preceding claims, wherein the mating connectors comprise at least one headband connector disposed on each of the at least one earcup and at least one earcup connector disposed on the left end and/or right end of the headband.

4. The headphone assembly of claim 3, wherein a single headband connector is disposed on each of the at least one earcup and a plurality of earcup connectors are disposed along a length of the left end and right end of the headband to allow for attachment of the at least one earcup at varying locations.

5. The headphone assembly of any one of the preceding claims, wherein the at least one earcup is removably attached to the left and/or right ends of the headband via mating connectors disposed along the outer surface of the at least one earcup and along the inner surface of the headband.

6. The headphone assembly of any one of the preceding claims, wherein when the at least one earcup is attached to the left end and/or right end of the headband, at least a portion of the outer

surface of the at least one earcup is in contact with at least a portion of the inner surface of the headband.

7. The headphone assembly of any one of the preceding claims, wherein the at least one earcup is selected from an over-the ear style and an on-ear style and combinations thereof.

8. The headphone assembly of any one of the preceding claims, comprising at least one pair of earcups.

9. The headphone assembly of any one of the preceding claims, comprising at least two pairs of earcups, wherein at least one pair of earcups is an over-the ear style and at least one pair of ear cups is an on-ear style.

10. The headphone assembly of any one of the preceding claims, wherein the at least one earcup is removably attached to left end and/or right end of the headband at varying locations along the left end and/or right end of the headband.

11. The headphone assembly of any one of the preceding claims, wherein the mating connectors are selected from at least one protrusion and at least one corresponding aperture, the at least one protrusion and at least one aperture being sized and shaped so that the at least one protrusion is movable through the at least one aperture thereby attaching the at least one earcup to the headband.

12. The headphone assembly of claim 11, further comprising a strap disposed on the at least one earcup, wherein the strap on each of the at least one earcup is configured so as to receive the ends of the headband therethrough so as to at least partially enclose and constrict motion of the headband relative to the at least one earcup.

13. The headphone assembly of claim 11, wherein the at least one protrusion is rotatable along its longitudinal axis, and wherein the shape of the at least one protrusion provides a varying cross

sectional shape upon rotation, thereby preventing movement of the at least one protrusion through the at least one aperture when rotated.

14. The headphone assembly of claim 13, wherein the at least one earcup is attached to the headband by passing the at least one protrusion through the at least one aperture and rotating the at least one protrusion to prevent movement of the at least one protrusion out of the at least one aperture, and wherein the at least one earcup is removed from the headband by rotating the at least one protrusion to allow movement of the at least one protrusion out of the at least one aperture, and withdrawing the at least one protrusion from the at least one aperture.

15. The headphone assembly of claim 11, wherein the at least one protrusion is disposed extending from the outer surface of the at least one earcup, and the at least one aperture is disposed along the left and/or right ends of the headband.

16. The headphone assembly of claim 15, wherein the at least one protrusion comprises a spring loaded pin that allows for motion of the pin toward and away from the inner surface of the at least one earcup.

17. The headphone assembly of any one of the preceding claims, wherein one or more portions of the at least one earcup are fabricated of one or more materials selected from the group consisting of leather, suede, denim, canvas, silk, real fur, faux fur, fabric, recycled materials, jewels, metals, plastics, ceramics, and combinations thereof.

18. The headphone assembly of claim 17, comprising a plurality of interchangeable earcups and at least one headband, wherein the plurality of interchangeable earcups differ from each other in the one or more materials.

19. The headphone assembly of claim 18, comprising a plurality of interchangeable pairs of earcups and at least one headband, wherein the plurality of interchangeable pairs of earcups differ from each other in the one or more materials.

20. The headphone assembly of any one of the preceding claims, comprising a plurality of interchangeable earcups and at least one headband, wherein the interchangeable earcups differ from each other in size, shape, color, and/or materials.

21. The headphone assembly of any one of the preceding claims, comprising a plurality of interchangeable pairs of earcups and at least one headband, wherein the interchangeable pairs of earcups differ from each other in size, shape, color, and/or materials.

22. The headphone assembly of any one of the preceding claims, wherein one or more portions of the headbands are fabricated of one or more materials selected from the group consisting of leather, suede, denim, canvas, silk, real fur, faux fur, fabric, recycled materials, jewels, metals, plastics, ceramics, and combinations thereof.

23. The headphone assembly of claim 22, comprising a plurality of interchangeable headbands, wherein the plurality of interchangeable headbands differ from each other in the one or more materials.

24. The headphone assembly of any one of the preceding claims, comprising a plurality of interchangeable headbands, wherein the interchangeable headbands differ from each other in size, shape, color and/or materials.

25. An accessory pack for a headphone assembly of any one of the preceding claims, comprising:

at least one replacement headband, the at least one replacement headband having an inner surface, an outer surface, a left end and a right end, and a mating connector disposed thereon for connection to the at least one earcup of the headphone assembly.

26. The accessory pack of claim 25, wherein the at least one replacement headband differs from the headband of the headphone assembly in size, shape, color and/or materials.

27. An accessory pack for a headphone assembly of any one of the preceding claims 1 to 24, comprising:

at least one replacement earcup, the at least one replacement earcup having an inner surface and an outer surface, and a mating connector disposed thereon for connection to the at least one headband of the headphone assembly.

28. The accessory pack of claim 27, wherein the at least one replacement earcup differs from the at least one earcup of the headphone assembly in size, shape, color and/or materials.

FIG. 1

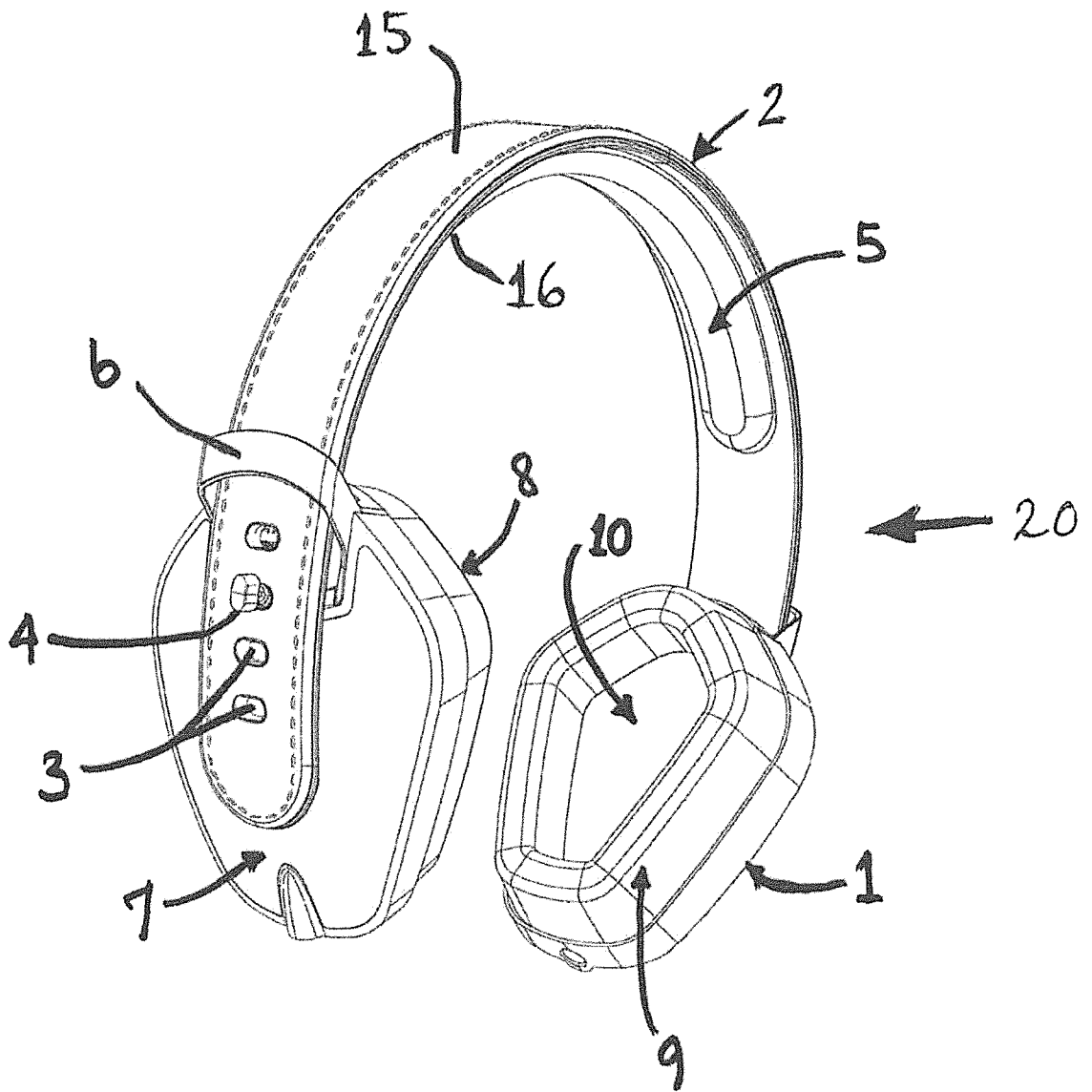


FIG. 2A

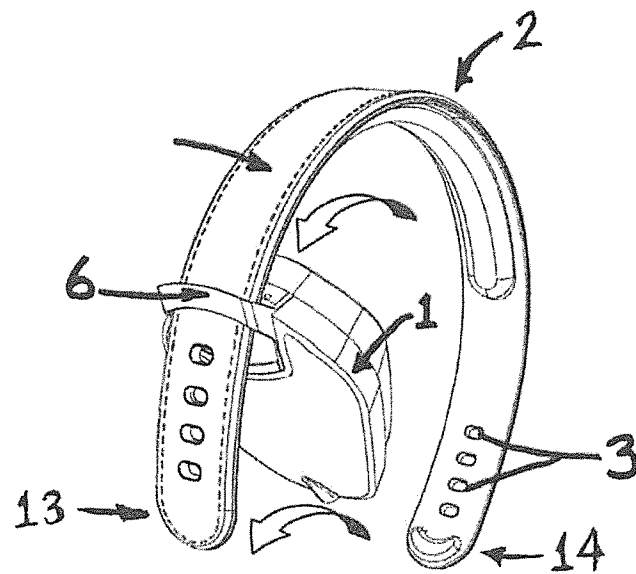
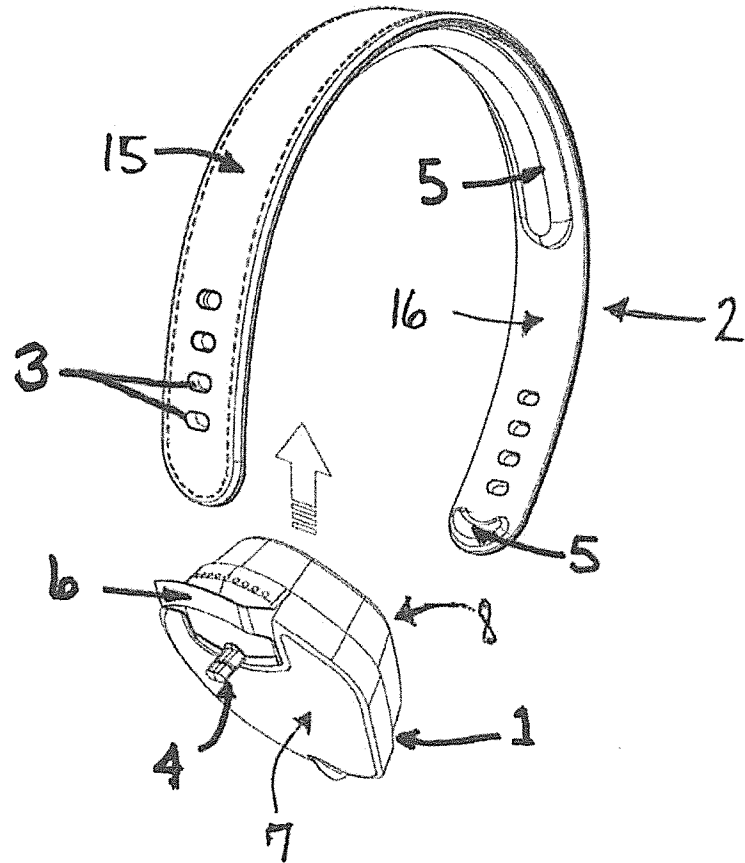


FIG. 2B

3/7

FIG. 2C

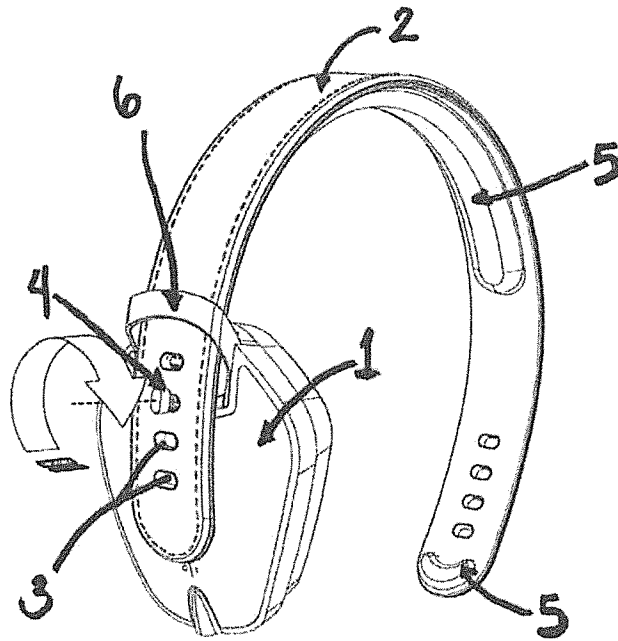
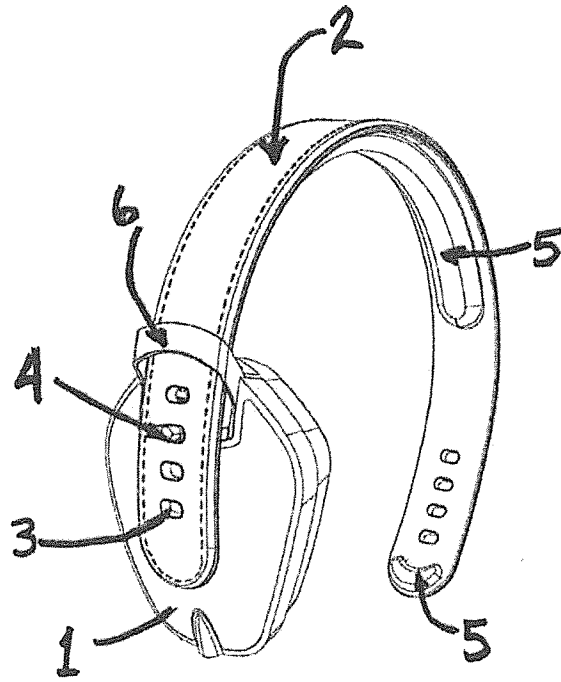


FIG. 2D

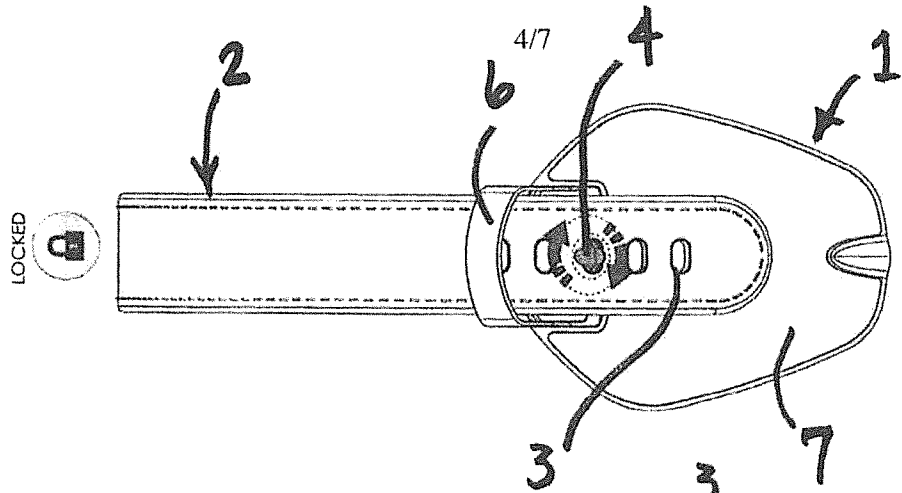


FIG. 3A

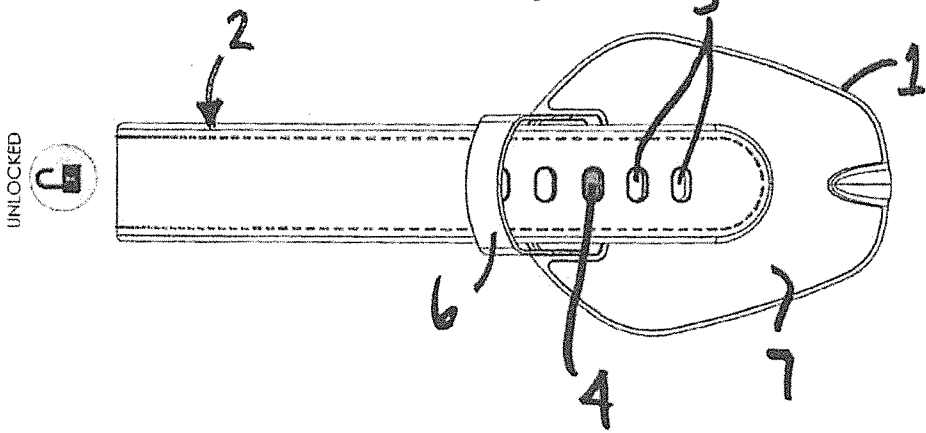


FIG. 3B

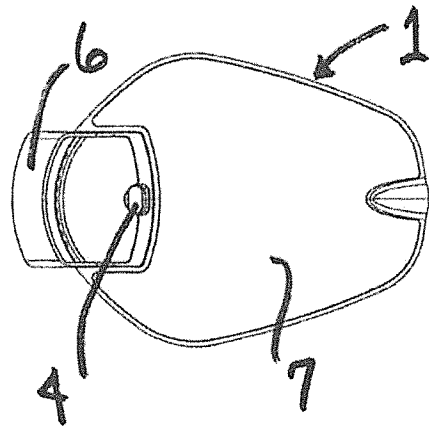


FIG. 3C

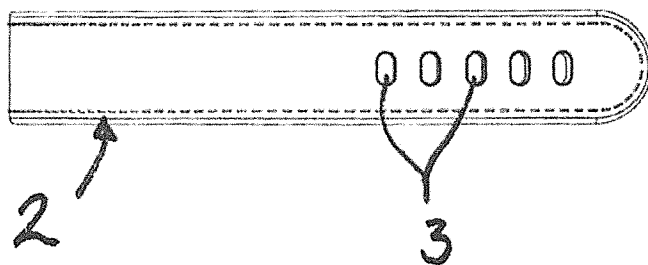


FIG. 3D

FIG. 4A

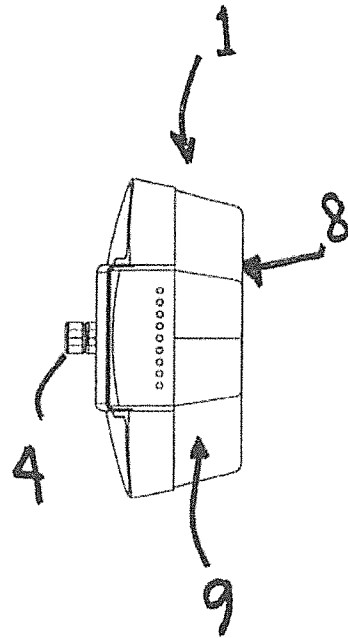
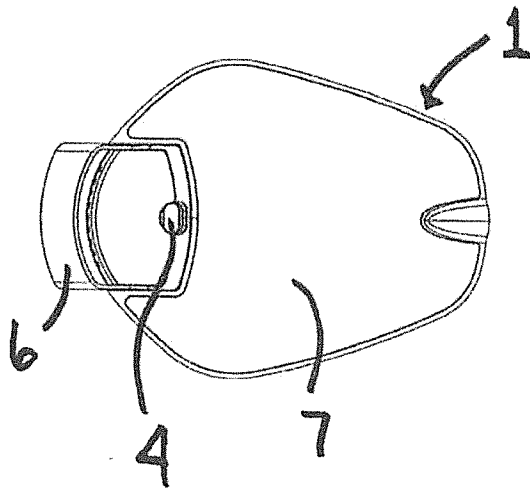


FIG. 4B

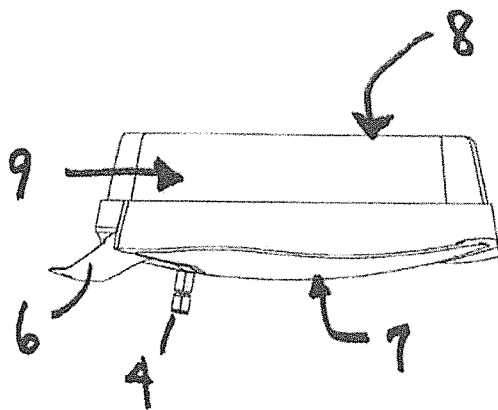


FIG. 4C

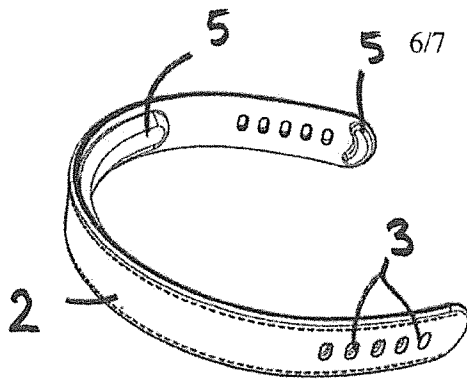


FIG. 5A

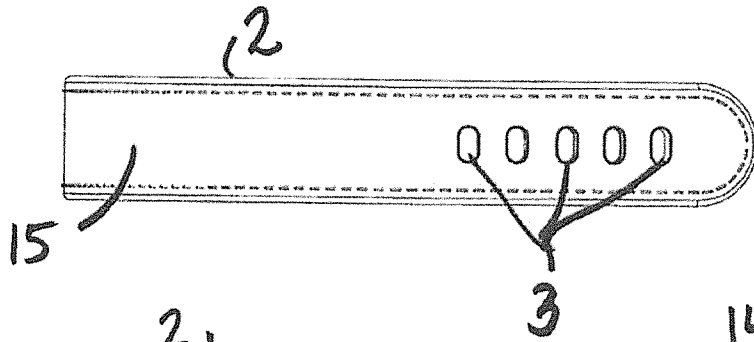


FIG. 5B

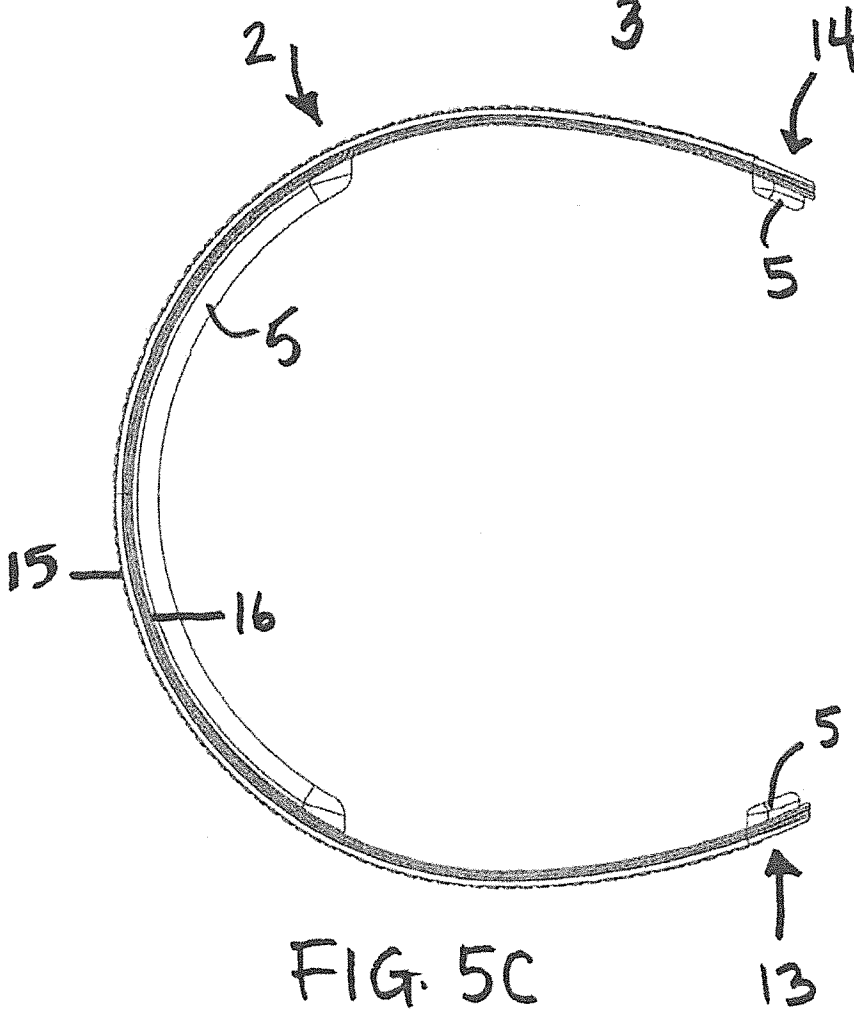


FIG. 5C

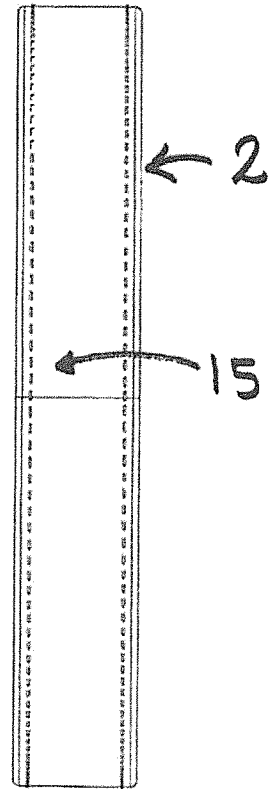


FIG. 5D

FIG. 6A

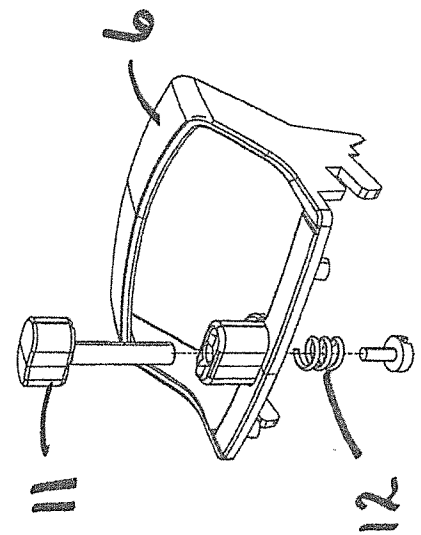
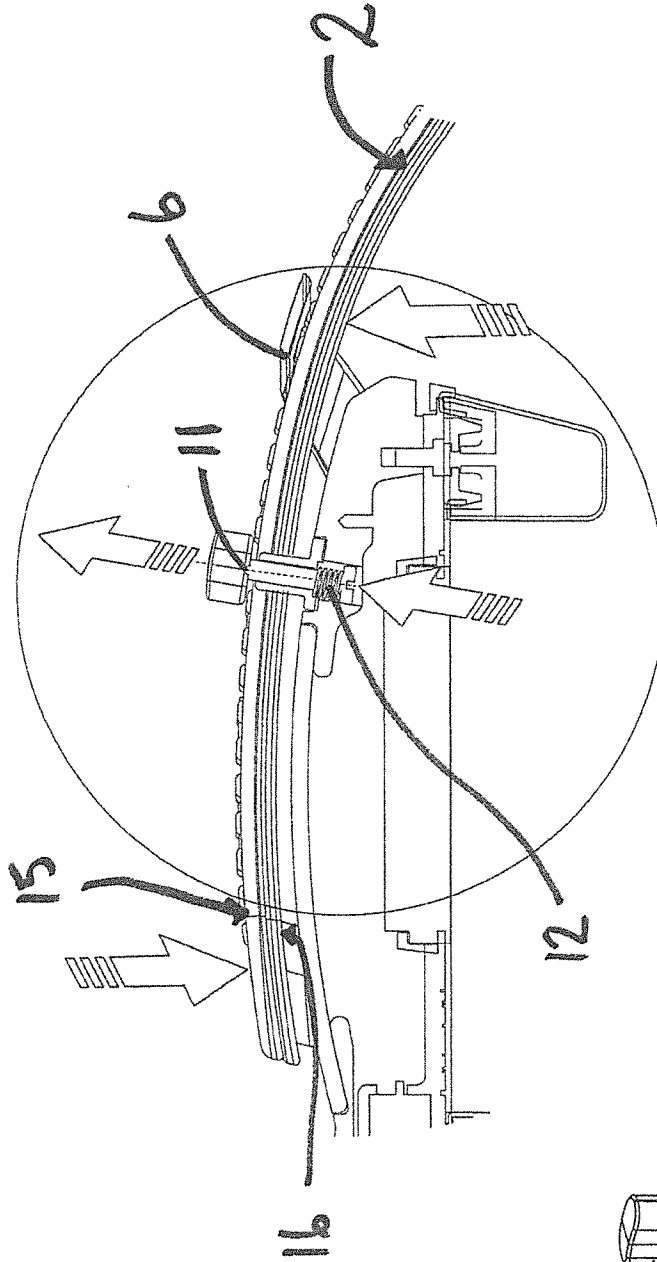


FIG. 6B

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2015/000174

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04R1/10 H04R5/033
ADD.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
H04R
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/062454 A1 (ZOUND IND INTERNAT AB [SE]; PETERSEN ERIK [SE]) 2 May 2013 (2013-05-02) column 3, line 30 - column 8, line 32 -----	1-28
X	CN 203 708 433 U (DONGGUAN SCENARIO PLANNING ELECTRONIC TECHNOLOGY CO LTD) 9 July 2014 (2014-07-09) abstract -----	1
X	US 2014/112519 A1 (CHEN CHUN-CHIEH [TW]) 24 April 2014 (2014-04-24) the whole document -----	1
X	US 3 122 613 A (GONGOLL VERNON F ET AL) 25 February 1964 (1964-02-25) the whole document -----	1
	-/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 7 March 2016	Date of mailing of the international search report 16/03/2016
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Coda, Ruggero
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2015/000174

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 268 554 A (FRANK SHAW) 5 December 1882 (1882-12-05) the whole document	1
X	----- US 2014/177884 A1 (MINARIK RYAN [US] ET AL) 26 June 2014 (2014-06-26) the whole document -----	1,17-28

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IT2015/000174

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013062454	A1	02-05-2013	NONE

CN 203708433	U	09-07-2014	NONE

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			US 2014112519 A1 24-04-2014

US 3122613	A	25-02-1964	NONE

US 268554	A	05-12-1882	NONE

US 2014177884	A1	26-06-2014	NONE
