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Clip For Pendant Of Audio Device System Background

N/A

CLIP FOR PENDANT OF AUDIO DEVICE SYSTEM BACKGROUND

ABSTRACT OF THE DISCLOSURE

Aspects of the disclosure are directed to a positioning device for a pendant of an audio device. An example positioning device may include a cable attachment mechanism, a pendant coupling mechanism housing at least one magnet, and an elongated arm. The pendant coupling mechanism may be configured to be removably coupled to the pendant of the audio device so as to maintain the pendant in a substantially fixed position. The elongated arm may be flexible and space the cable attachment mechanism and the pendant coupling mechanism apart from one another. Headphones producing bone conducting audio cause vibrations in a user’s bone or cartilage. The transducers vibrate the user's inner ear indirectly via vibrations in the user's skull or other bones or cartilage in the user's head proximate to where the transducers are positioned. Sound is perceived by the user primarily via the cochlea in the user's inner ear while bypassing the user’s ear drum. If the bone conducting transducer does not make adequate contact with the user's skull, sound quality is lost.

BRIEF SUMMARY

Aspects of the disclosure provide a positioning device for a pendant of an audio device. An example positioning device may include a cable attachment mechanism, a pendant coupling mechanism, and an elongated arm. The pendant coupling mechanism may house at least one magnet. The pendant coupling mechanism may be configured to be removably coupled to the pendant of the audio device so as to maintain the pendant in a substantially fixed position. The elongated arm may space the cable attachment mechanism and the pendant coupling mechanism apart from one another, the elongated arm being flexible.

In one example, the pendant coupling mechanism may form a first end of the positioning device and the cable attachment mechanism may form the second end of the positioning device. The pendant coupling mechanism may further include a housing that has a first end, a second end, and a body that extends therebetween. The magnet may be positioned within the body of the housing. The body may have an elongated length extending between the first and second ends and a width that extends perpendicular to the elongated length. The elongated length being may be greater than the width. The first end of the housing may be attached to the elongated arm so that the elongated length of the pendant coupling mechanism is oriented in a same direction the elongated arm extends.

In another example, the cable attachment mechanism may further include a flexible clip that is configured to be removably engageable with a cable of the audio device. The cable attachment mechanism may be a clamp configured to be removably engageable with a cable of the audio device.

In a further example, the positioning device may be comprised of at least one material selected from a group that includes fabric, leather, and a thermoplastic. In yet a further example, the elongated arm may have a length ranging from 2 to 4 inches. The elongated arm may have a length greater than 4 inches.

Other aspects of the disclosure provide for an audio device system. An example audio device system may include a first cable; a pendant; and a positioning device. The pendant may be attached to an end of the first cable. The pendant may include a joining surface and a first magnet positioned adjacent the joining surface. The positioning device may be removably attachable to the audio device for positioning the pendant. The positioning device may further include a cable attachment mechanism, a pendant coupling mechanism, and an elongated arm. The cable attachment mechanism may include one or more arms configured to

removably extend around at least a portion of the first cable. The pendant coupling mechanism may be spaced away from the cable attachment mechanism and be configured to be removably attachable to the pendant. The pendant coupling mechanism may have a major surface and a second magnet disposed adjacent the major surface. The elongated arm may extend between the cable attachment mechanism and the pendant coupling mechanism.

In one example, the elongated arm may be rigid. The system further may further include an ear hook attached to a second end of the first cable.

In another example, the pendant coupling mechanism may further include a housing that has a first end, a second end, and a body extending between the first and second ends. The body may have an elongated length that extends between the first and second ends. The width may extend perpendicular to the elongated length. The elongated length may be greater than the width.

In still another example, the first end of the housing may be attached to the elongated arm so that the elongated length of the pendant coupling mechanism is oriented in a same direction that the elongated arm extends.

Further aspects of the disclosure provide for a pendant of an audio device that includes a flexible arm, a clip attachment mechanism, and a coupling mechanism. The clip attachment mechanism may be disposed at a first end of the flexible arm and the coupling mechanism may be disposed at the second end of the flexible arm. The coupling mechanism may be configured to be removably coupled to the pendant.

In one example, the coupling mechanism further includes a housing that has a first end positioned adjacent the flexible arm and an opposed second free end. The surface of the positioning device that extends from the first end of the clip attachment mechanism to the

second end of the flexible arm may be a continuous and substantially planar surface. At least one magnet positioned within the housing of the coupling mechanism.

In another example, the clip attachment mechanism may include a flexible clip that is configured to be removably engageable with a cable of the audio device. The clip attachment mechanism may further include a clamp configured to be removably engageable with a cable of the audio device.

BRIEF DESCRIPTION OF THE FIGURES

FIGURE 1 is an exploded perspective view of an audio device system that includes an audio device and a pendant positioning device according to aspects of the disclosure;

FIGURE 2 is a front plan view of the pendant positioning device shown in FIGURE 1;

FIGURE 3 is a side plan view of the pendant positioning device shown in FIGURE 1;

FIGURE 3A is a schematic top plan view of the pendant positioning device shown in FIGURE 1;

FIGURE 4 is an alternative pendant positioning device according to aspects of the disclosure;

FIGURE 5 is a front plan view of the assembled audio device system of FIGURE 1 according to aspects of the disclosure;

FIGURE 6 is an enlarged perspective view of a portion of the assembled audio device system according to aspects of the disclosure;

FIGURE 7 is an enlarged side view of a portion of the assembled audio device system according to aspects of the disclosure;

FIGURE 8 is an enlarged side view of the audio device system according to aspects of the disclosure;

FIGURE 9 is an enlarged side view illustrating an example use of the audio device system according to aspects of the disclosure; and

FIGURE 10 is a front view illustrating an example use of the audio device system according to aspects of the disclosure.

DETAILED DESCRIPTION

OVERVIEW

Aspects of the disclosure are directed to an audio device system that includes a positioning device for an audio device with pendant. The functions of an audio device with pendant can be diminished or provide inaccurate results due to movement and improper orientation of the pendant. To address this, a pendant positioning device can be removably attached to the pendant of the audio device to maintain the pendant in a substantially fixed position and orientation.

A pendant positioning device for the pendant of an audio device according to aspects of the disclosure can enhance the functions of the audio device system. For example, multiple microphones in the pendant of the audio device allow for beamforming to extract speech signals in a noisy environment. The pendant positioning device can enhance beamforming by maintaining the position of the pendant in a constant position throughout use of the audio device. Furthermore, the pendant positioning device can orient a length of the pendant in a direction extending along the length of the body of a user to provide easy access to controls on the pendant, as well as to ensure that other components with the pendant, such as a gyroscope or accelerometer, remain in a constant reference position. These examples present only a few of the many uses of a pendant positioning device according to aspects of the disclosure.

According to one example, the pendant positioning device of the audio device system can include a cable attachment mechanism, a pendant coupling mechanism that houses at least one magnet, and an elongated arm spacing the cable attachment mechanism and the pendant

coupling mechanism apart from one another. The pendant coupling mechanism can be configured to be removably attachable to the pendant of the audio device to allow for easy removal and reuse of the pendant positioning device.

The pendant coupling mechanism may be provided at one end of the pendant positioning device. The pendant coupling mechanism may include a main body that may be similar in shape to the body of the pendant of the audio device. In one example, when the pendant is oval or pill-shaped, the main body of the pendant attaching mechanism is also oval or pill-shaped. In some examples, the main body can be elongated and include first and second opposed ends that are rounded.

At least one major surface of the main body of the pendant coupling mechanism may be substantially planar. This can allow for the main body to have a greater surface area to mate with the pendant or a material disposed between the pendant and the main body of the positioning device when in use. In other examples, the major surface may include surface roughenings.

At least one magnet may be provided within the main body of the pendant coupling mechanism. For example, a single magnet encompassing a majority of the length or an entire length of the body may be utilized. Alternatively, a plurality of magnets may be disposed throughout the main body. The strength of the at least one magnet in the main body of the pendant coupling mechanism is sufficiently strong enough to attract one or more magnets disposed within the pendant so as to position the pendant relative to the position of the main body of the pendant positioning device. Additionally, the magnets in the main body are strong enough to attract the magnets in the pendant and hold the pendant in place when clothing is disposed between the pendant and the main body of the pendant positioning device.

A cable attachment mechanism may be provided at a second end of the pendant positioning device. The cable attachment mechanism may be used to removably attach the pendant positioning device to the cables of the audio device. The cable attachment mechanism may be a resilient c-clip that includes first and second arms and an opening therebetween. The c-clip can be positioned around the cables at a point where the left cable and the right cable meet. The flexible material of the c-clip allows for the first and second arms to be separated, so that the arms of the c-clip can wrap around the first and second cables. When the force is released, the first and second arms can return to their original position and secure the first and second cables within the c-clip.

The cable attachment mechanism can alternatively include different types of clips or attachments. A clamping mechanism or a hinged device are examples of alternative attachment mechanisms that can be used to secure the pendant positioning device to the cables of the audio device. Additionally, the cable attachment mechanism may be formed as a unitary piece with the remainder of the pendant positioning device. In other examples, the cable attachment may be coupled to the pendant device or may be a free standing device that can be attached to the pendant positioning device.

The elongated arm extends between the main body and the cable attachment of the positioning device. The elongated arm is sufficiently long enough to extend between a point where two cables meet together and the position of the pendant. The width of the elongated arm may be substantially equal to the width of the two cables of the audio device when joined together or slightly less than the width of the two cables of the audio device joined together.

The elongated arm may be flexible so that it is capable of being moved relative to the cable attachment mechanism. In other embodiments, the elongated arm may be rigid and joined to the cable attachment mechanism by an intermediate flexible joint.

Turning to the pendant of the audio device, the pendant may include a major surface that is slightly rounded. At least a portion of the major surface includes a receiving surface that will mate with the pendant coupling mechanism. The receiving surface may be positioned within a central portion of the major surface. One or more magnets may be positioned below the receiving surface within the housing of the pendant.

The positioning device can be removably attachable to the audio device. The cable attachment mechanism removably attaches a first end of the positioning device to the audio device, and particularly one or more cables of the audio device. The cable attachment mechanism can be positioned adjacent the junction between the first and second cables. When the cable attachment mechanism is a c-clip, the arms of the c-clip wrap around the cables of the audio device to secure the positioning device to the pendant.

The pendant coupling mechanism removably attaches a second end of the positioning device to the audio device, and particularly the pendant. Magnets in the pendant coupling mechanism can be attracted to magnets in the pendant of the audio device.

When the cable attachment mechanism is attached to the cables, the main body of the pendant coupling mechanism can be moved toward and away from the pendant. For example, the pendant coupling mechanism can move relative to the fixed position of the cable attachment mechanism. This allows the positioning device to function as a clip, and to clip the pendant to clothing of a user. For example, while the cable attachment mechanism is attached to the cables, a user can position the positioning device within the user's clothing, e.g., close to the body of the user. The pendant may be positioned on the exterior of the body and the clothing of the user. When the pendant and the positioning device are attracted to one another through the magnets, the clothing of the user is positioned between the pendant and the pendant coupling mechanism.

The width of the arm of the securing device may be equal to or less than the width of the cables joined together. This can help to provide a more pleasing and aesthetic look. Similarly, because the pendant coupling mechanism has a surface area that is smaller than the surface area of the pendant, a user will not see the arm or pendant coupling mechanism when attached to the audio device.

EXAMPLE SYSTEMS

An example audio device system 10 according to aspects of the disclosure is illustrated in FIGURE 1. The audio device system 10 includes an audio device 20, a weighted pendant 60, and a pendant positioning device 100 that can be removably attached to the pendant 60. As will be discussed in greater detail herein, the audio device 20 can be an open audio device with a bone conduction transducer (BCT) 30 attached to ear hooks 40 at one end of a cable 50 and a plug or weighted pendant 60 at an opposed end of the cable 50. In this disclosure, the bone conduction transducer is not limited to transmitting sound through bone, but further includes transmission of sound through cartilage, such as the pinna of the ear of a user, as well as transmission of sound through a combination of bone and cartilage. However, for ease of discussion, the transducer will continue to be referred to as a BCT. The weighted pendant 60 can include a housing 62 that has an interior surface 64 and an exterior surface 66. Housing 62 can house electronic features of the audio device system 10, such as, for example, one or more microphones, a gyroscope, a compass, and user control buttons.

FIGURE 2 illustrates an enlarged front view of the pendant positioning device 100. The pendant positioning device 100 includes a first end 102 and a second end 104. The pendant positioning device 100 may include a cable attachment mechanism 110 positioned at the second end 104, an elongated arm 120, and a pendant coupling mechanism 130 positioned at the first end 102. The pendant coupling mechanism 130 can be configured to be removably

attachable to the pendant 60 (FIGURE 1) of the audio device 20 to allow for easy removal and reuse of the pendant positioning device 100.

The pendant coupling mechanism 130 may include a main body 132 that has a first end 134 adjacent to the elongated arm 120. The main body 132 may also include a second free end 136, which can be positioned at the outermost edge of the pendant positioning device 100. The first and second ends 134,136 may be rounded so that the overall shape of the main body 132 corresponds to the shape of the pendant. As shown, main body 132 is oval or pill-shaped to match the oval or pill-shape of the pendant 60 (FIGURE 1) of the audio device 20. In other examples, the pendant coupling mechanism 130 can take on a variety of different shapes that may or may not correspond to the shape of the pendant.

As shown in FIGURE 3, which is a side plan view of the pendant positioning device 100, main body 132 of the pendant coupling mechanism 130 includes an outer surface 138 and an interior surface 140. At least a majority of the interior surface 140 of the main body 132 may be substantially planar. For example, major surface 142, which in this example is coextensive with interior surface 140, is substantially planar. This can allow for the main body 132 to have a greater surface area in which to mate with the pendant 60 or with the clothing of a user that may be positioned between the pendant 60 and the main body 132 during use. In other examples, portions of the interior surface 140 may be rounded or non-planar so that the major surface 142 of the interior surface 140 does not coextend with the entire interior surface 140, and so that the major surface 142 encompasses less surface area than the interior surface 140.

One or more magnets may be provided within the main body of the pendant coupling mechanism 130. For example, a magnet 144 may be disposed within the main body 132. As shown, magnet 144 can encompass a majority of the length of the main body 132. The

magnet 144 may possess a strength that is sufficient to attract one or more magnetic objects that may be disposed within the pendant (FIGURE 1) so as to position the pendant relative to the position of the main body of the pendant positioning device. Additionally, the magnet 144 may be strong enough to attract the magnets in the pendant and hold the pendant in place when clothing or the like is disposed between the pendant 60 and the main body 132 of the pendant coupling mechanism. For example, the magnet should be sufficiently strong enough to secure a the pendant in place in a fixed position adjacent the clothing of a user while the user is engaged in daily activities such as running, biking, and cooking. In an example where a pendant weighs 14-15 grams, the pendant may have a pull force of 0.1-0.4 Newtons.

In other examples, a plurality of magnets may be disposed throughout the main body. For example, as shown in the pendant positioning device 200 of FIGURE 4, a plurality of magnets 244 are dispersed throughout the main body.

A cable attachment mechanism may be provided at the second end 104 of the pendant positioning device 100. Referring back to FIGURE 2, the cable attachment mechanism 110 may be used to removably attach the pendant positioning device 100 to the cables 50 of the audio device 20 (FIGURE 1). The cable attachment mechanism 110 may be integrally formed with the pendant positioning device 100. In other examples, the cable attachment mechanism may be a separate device that is not integrally formed with the remainder of the pendant positioning device 100. For example, the cable attachment may be a device capable of clipping the first end of the pendant positioning device 100 to the cable 50, but one that can be removed away from the pendant positioning device 100.

The cable attachment mechanism may be a resilient clip. For example, cable attachment mechanism 110 can be a c-shaped clip comprised of a rigid but flexible material. These materials may include, for example, polymeric material, thermoplastic, leather, combinations

of rigid and softer materials, such as a rigid plastic laminated with leather to provide for a comfortable feel against the skin of a user. As shown in FIGURES 3 and 3A, the cable attachment mechanism 110 includes a first arm 146 and a second arm 148 biased toward one another. An entrance 149 may lead to an opening 150 formed in the space positioned between the first and second arms 146, 148. This opening 150 may be a lateral opening sized to laterally receive an object therein. As will be discussed in further detail herein, the force applied to the first and second arms 146,148 can be the force exerted by the cables 50 as the cables 50 pass through the lateral entrance 149 of the opening 150, which in this example, is smaller than the width of the cables 50. Alternatively, a user can manually separate first and second arms 146,148 apart and away from one another so that an object, such as the cables 50, can fit through the entrance 149 and into the opening. When the force is released, the first and second arms 146,148 can return to their original position.

In other examples, the cable attachment mechanism can include different types of clips or attachments provided at or adjacent the end of the pendant positioning device 100. For example, an alternative cable attachment mechanism may include a hinged clip with jaws biased together. The jaws may be opened by the user exerting a force at the rear of the clip adjacent where the jaws are joined together by the hinge.

The elongated arm 120 extends between the main body 132 of the pendant coupling mechanism and the cable attachment mechanism 110 of the pendant positioning device 100. As shown in FIGURE 3, the elongated arm 120 spaces the pendant coupling mechanism 130 and the cable attachment mechanism 110 apart from one another. The arm 120 can be long enough to extend between a point where two cables 50 extending from the ear hooks 40 meet together and the position of the pendant 60 (FIGURE 1). In one example, the elongated arm has a length L that ranges between two to four inches. In another example, the elongated arm

may be greater than four inches. The elongated arm 120 may have a width W1 (FIGURE 2) that is equal to, less than, or greater than a width W2 (FIGURE 1) of the two cables 50 of the audio device 20 when joined together.

The elongated arm 120 may be flexible. In one example, the length of the elongated arm 120 and the material forming the elongated arm 120 allows for the elongated arm 120 to flex. Elongated arm 120 may be flexible so that it is capable of being moved relative to the cable attachment mechanism 110. In other examples, the elongated arm 120 may be rigid and joined to the cable attachment mechanism 110 by another method, such as an intermediate flexible joint.

Turning now to FIGURE 5, a schematic rear view of the fully assembled audio device system 10 is shown. The fully assembled audio device system 10 can include the pendant positioning device 100 removably coupled or joined to the rear of the audio device 20. In this example, the pendant positioning device 100 is removably joined at a first end 102 to the interior surface 64 of the pendant 60 of the audio device 20, and attached at a second end 104 to the cables 50 of the audio device 20.

Turning to FIGURE 6, the cable attachment mechanism 110 removably attaches the second end 104 of the pendant positioning device 100 to the one or more cables 50 of the audio device 20. The cable attachment mechanism 110 may be joined to the audio device 20 at or near a point 162 where the cables 50 that extend from the left and right ear hooks 40 converge to form a y-shape. In other examples, the cable attachment mechanism 110 may be joined with the cables 50 at a point above or below point 162. When the cable attachment mechanism 110 is a c-clip, the arms of the c-clip wrap around the cables 50 of the audio device to secure the first end 102 of the pendant positioning device 100 to the cables 50.

The cables 50 can be laterally inserted into the cable attachment mechanism 110. For example, cable 50 can be inserted in a direction L through the entrance 149 to the opening 150 of the cable attachment mechanism 110. As shown in FIGURE 7, the thickness T1 of the cables 50 may be slightly greater than a width W3 (FIG. 3A) of the entrance 149 to the opening 150. As the cables 50 pass through the entrance 149, the cables apply a counter-force against a biasing force of the resilient first and second arms 146,148 of the clip attachment mechanism 110. A counter force of the cables 50 causes the first and second arms 146,148 to be forced apart and remain open until the cables 50 are fully positioned within the opening 150. When the cables 50 are seated within the opening 150, the first and second arms 146,148 will bias back together towards their original position and removably secure the cables 50 within the opening 150.

The pendant coupling mechanism 130 can be removably secured or coupled to a first end 102 of the positioning device 100 of the audio device 20, and particularly the pendant 60. Focusing first on the pendant 60, pendant 60 is shown having a slightly rounded interior surface 64. At least a portion of the interior surface 64 of the pendant 60 includes a receiving surface 68 that will mate with the pendant coupling mechanism 130 of the pendant positioning device 100. The receiving surface 68 may be positioned within a central portion of the interior surface 64. One or more magnets 70 may be positioned adjacent the receiving surface 68 within the housing 62 of the pendant 60.

The magnet 144 disposed within the pendant coupling mechanism 130 enables the pendant coupling mechanism 130 to be removably joined to the pendant 60. The magnet 144 attracts magnet 70 of the pendant 60 to form a removable connection therebetween. The interior surface 140 of the pendant coupling mechanism 130 joins with the receiving surface 68 of the pendant 60. The flexibility of the planar major surface 142 of the pendant coupling

mechanism 130 allows the pendant coupling mechanism 130 to conform to the contour of the receiving surface 68 of the pendant 60.

The pendant coupling mechanism 130 is capable of being moved toward and away from the pendant 60 when the cable attachment mechanism 110 is attached at its second end 104 to the cables 50. For example, as shown in FIGURE 8, the pendant coupling mechanism 110 can move relative to the fixed position of the cable attachment mechanism 110. The pendant coupling mechanism 130 may move in a direction A away from the pendant 60. The direction A may be angled with respect to a vertical axis of the pendant and cables 50, and along a planar axis perpendicular to the major surface 68. This can provide an opening 68 between the pendant 60 and the pendant positioning device 130.

The pendant positioning device 100 may have a wide range of motion when attached to the cables 50 of the pendant positioning device. With reference to FIG. 8, the flexibility of the pendant positioning device 100, as well as the lateral entrance 149 to the opening 150 of the cord coupling mechanism 110, which prevents the cord coupling mechanism 110 from being pulled away and detached from the cables 50, contribute the wide range of motion. The pendant positioning device 100 is at a first securing position when the pendant coupling mechanism 130 is in contact with the pendant 60. (See FIGURE 7.) The pendant positioning device 100 can be positioned in a second clipping position, where the pendant coupling mechanism 130 is detached from the pendant 60. The clipping position can be at a point anywhere along the range of motion permitted by the elongated arm 120. In other examples, the elongated arm 120 and pendant coupling mechanism 130 can be moved to an almost substantially perpendicular position relative to the cables 50, as represented by the elongated arm 120 shown in broken lines. Alternatively, elongated arm 120 and pendant coupling mechanism 130 can be moved in a substantially vertical direction, where the flexible arm and

pendant mechanism are moved upward by the user. The pendant positioning device 100 can therefore easily move back and forth between the first position and a desired second or clipping position.

The pendant positioning device 100 can function as a securing and positioning clip, which can maintain the position of the pendant 60 adjacent an intermediate material, such as the clothing of a user. FIGURE 9 illustrates an example where the pendant positioning device 100 clips the pendant 60 to a user's clothing 170. When pendant positioning device 100 is pulled away from the pendant 60, the clothing 170 of a user can be positioned between the pendant 60 and the pendant positioning device 100. The pendant positioning device 100 secures the pendant 60 in place, so that the pendant 60 is properly oriented to perform all necessary functions.

When the audio device system 10 is worn, a majority of the pendant positioning device 100 may be concealed behind the audio device 20. In the example shown in FIGURE 10, the pendant may rest on a user's chest with the exterior surface 66 facing forward and away from the user, the interior surface 64 faces toward the clothing 170 of the user and the user's chest. The pendant positioning device 100 will be removably joined to the rear of the audio device 20 and closer to the body of the user than the pendant 60.

The positioning device may be constructed so that the positioning device will be at least partially concealed behind the cables 50. For example, when worn, only the cable attachment mechanism 110 is visible. Elongated arm 120 of the pendant positioning device 100 may have a width W1 (FIGURES 2 and 8) that is slightly less than the width W2 (FIGURE 1) of the cables 50 when joined together adjacent point 162. This allows for a majority of the pendant positioning device 100 to be concealed behind the cables 50 when the pendant positioning device 100 is joined thereto. Similarly, because the pendant coupling mechanism

130 has a surface area that is smaller than the surface area of the pendant, a user will not see the arm or pendant coupling mechanism 130 when attached to the audio device 20, especially when clothing is positioned between the pendant positioning device 100 and the pendant 60. In other examples, it may be desired for the width W1 of the elongated arm 120 to be greater than the width W2 of the cables 50.

As previously discussed, the audio device 20 may be a wearable open-ear audio device. The open-ear audio device 20 may provide bone and/or cartilage conducting audio. Bone and/or cartilage conducting audio typically requires a decent contact force to the body in order to obtain good quality audio. The BCT needs to be coupled to the body in order to transmit the necessary vibrations. In one example, the BCT may contact the crease where the auricle, or pinna, of the user's ear connects to the user's head. In other examples, the BCT may directly contact the cartilage of the auricle of the user's ear, or may be secured against the skull of the user. In one example, the BCT is at least partially housed in a pod that may be pill-shaped, or a generally long oval shape, and may have surfaces that are concave to fit the curvature of the backs of the user's ears, such as the crease where the auricle of the user's ear connects to the user's head. The BCTs may be connected to one or more processors, a circuitry board, a battery, a memory, one or more sensors, a microphone, an amp, and/or other components. These components may be located remotely from the BCTs.

The audio device may include two ear hooks 40. Each ear hook 40 is shaped to curve around at least a portion of the user's ear. Each ear hook 40 may be configured to support a BCT 30, and a cable 50 may extend from each BCT 30. As previously discussed, the cables 50 may join together, forming a "Y" shape. The point 162 at which the cables join may be adjustable for the comfort of the user. Plug or pendant 60 may be included in the audio device 20 and attached to an opposite end of the cables 50 at the second end of the device. The pendant 60

may be configured to attach or be secured to another device to receive audio information for bone conduction.

Each ear hook 40 may contact the crease where the auricle, or pinna, of the user's ear connects to the user's head. Ear hooks 40 may contact at least the user's zygomatic process and the user's mastoid process and/or other nearby portions of the temporal bone. The ear hooks 40 may also contact the cartilage of the user's auricle. The ear hooks 40 may therefore be tucked behind the helix, antihelix, and lobule of the user's ear. Furthermore, the surface of the ear hook 40 may be shaped to accommodate the shape of the portions of the temporal bone and ear that it contacts. The opening of the "C" may then open toward the front of the user's ears, such as near the tragus and the lobule.

When worn, the ear hook 40 may naturally rest at the top of a user's ear. The majority of the force of the ear hooks 40, without more, is downward into the top of the user's ear. A BCT positioned away from the top of the user's ear, for example, 45 degrees or 90 degrees from the top, there may not be enough contact force between the BCTs and the user's head to provide clear audio output to the user.

The cables 50 may be designed to provide a torque to the ear hooks 40 and the BCTs such that the BCTs 30 are pressed firmly against the user's ears. For example, the ear hook 40 may position the BCT 30 against the cartilage or the pinna or auricle of the ear. The positioning of the cables 50 can produce a torque which cause the BCTs 30 attached to the ear hooks 40 to contact a portion of the user's skull and/or cartilage of the auricle of the ear with increased contact force. . The cables 50 may protrude from the BCTs 30 or portions of the ear hooks at a particular angle with respect to a direction of gravity. The cables 50 may extend straight for a predetermined distance at the particular angle. When the cable is weighted, for example by the gravitational force of a pendant coupled thereto, the angle at

which the cable 50 protrudes from the BCT 30 may cause a torque to be applied to the BCT, the torque in turn increasing a contact force between the BCT 30 and the user's skull and/or cartilage. The strain relief in the cables 50 may cause the cable 50 to extend more or less straight from the ear hooks 40 before curving. The natural pull of gravity on the cable at this angle provides a torque on the ear hooks 40. The force provided may rotate the ear hooks 40 into the user's ears, thereby increasing the contact force between the BCTs positioned at the backs of the user's ears or anywhere else away from the tops of the user's ears.

As discussed above, the pendant 60 may be attached to the cables 50 at the second end of the audio device. A mass of the pendant 60 may exert a force on the cables 50, thereby increasing the contact force between the BCTs 30 that extend through the ear hook and the user's cartilage and/or skull. For example, the pendant 60 may weigh between 10 and 20 grams. The pendant 60 may house components of the audio device system 10 such as one or more processors, a circuitry board, a battery, a memory, one or more sensors, a microphone, and/or an amp that are connected to the BCTs. Other components may include a gyroscope, a compass, and user input controls, such as volume or play/pause controls, charging input, such input for a USB Type-C connector, and pairing mechanisms. Including these components in the pendant 60 not only allows for a sleeker design, but also provides the mass to the pendant to provide the needed contact force for the BCTs. The components in the pendant 60 may be connected to the BCTs 30 or other components in via wires running through the cables.

The pendant positioning device 100 can be used to keep the pendant 60 oriented in the same position when worn by a user. Securing the pendant 60 in a constant position optimizes the functions of the pendant and components within the pendant, including audio, sensors, accelerometers, and the like. This can be beneficial to the user as it keeps the pendant 60 secured in a constant position during all types of activity contemplated by a user. For

example, if the audio device includes a GPS that tracks location and distance, keeping the pendant and the compass within the GPS oriented in the same position, the audio device system can provide more accurate results.

The pendant positioning device 100 can be used to attach or secure the pendant 60 to any type of clothing worn by a user. For example, the user may be using the audio device system while at the gym, work, shopping, or the like. The pendant positioning device is capable of securing the position of the pendant 60 to different types of clothing, such as thick cotton, a dress shirt, a flannel shirt, and any other types of material.

The appearance of the pendant positioning device 100 can also vary. For example, a user attending a formal event may desire to use a gold-plated pendant positioning device. Similarly, since at least a portion of the pendant positioning device may be in direct contact with the skin of the user or adjacent the skin of a user, the user may prefer to select a pendant positioning device 100 with a soft or flexible surface, such as one that includes soft leather.

In the examples discussed above, relative positions such as lateral, longitudinal, horizontal, vertical, top, bottom, and the like are used for reference only and are not intended to be limiting with respect to particular positions of the elements they are used to describe.

Unless otherwise stated, the foregoing alternative examples are not mutually exclusive, but may be implemented in various combinations to achieve unique advantages. As these and other variations and combinations of the features discussed above can be utilized, the foregoing description of the embodiments should be taken by way of illustration rather than by way of limitation. In addition, the provision of the examples described herein, as well as clauses phrased as “such as,” “for example,” “including” and the like, should not be interpreted as limiting the subject matter to the specific examples; rather, the examples are

intended to illustrate only one of many possible embodiments and that other arrangements may be devised without departing from the spirit and scope of the present disclosure**.**

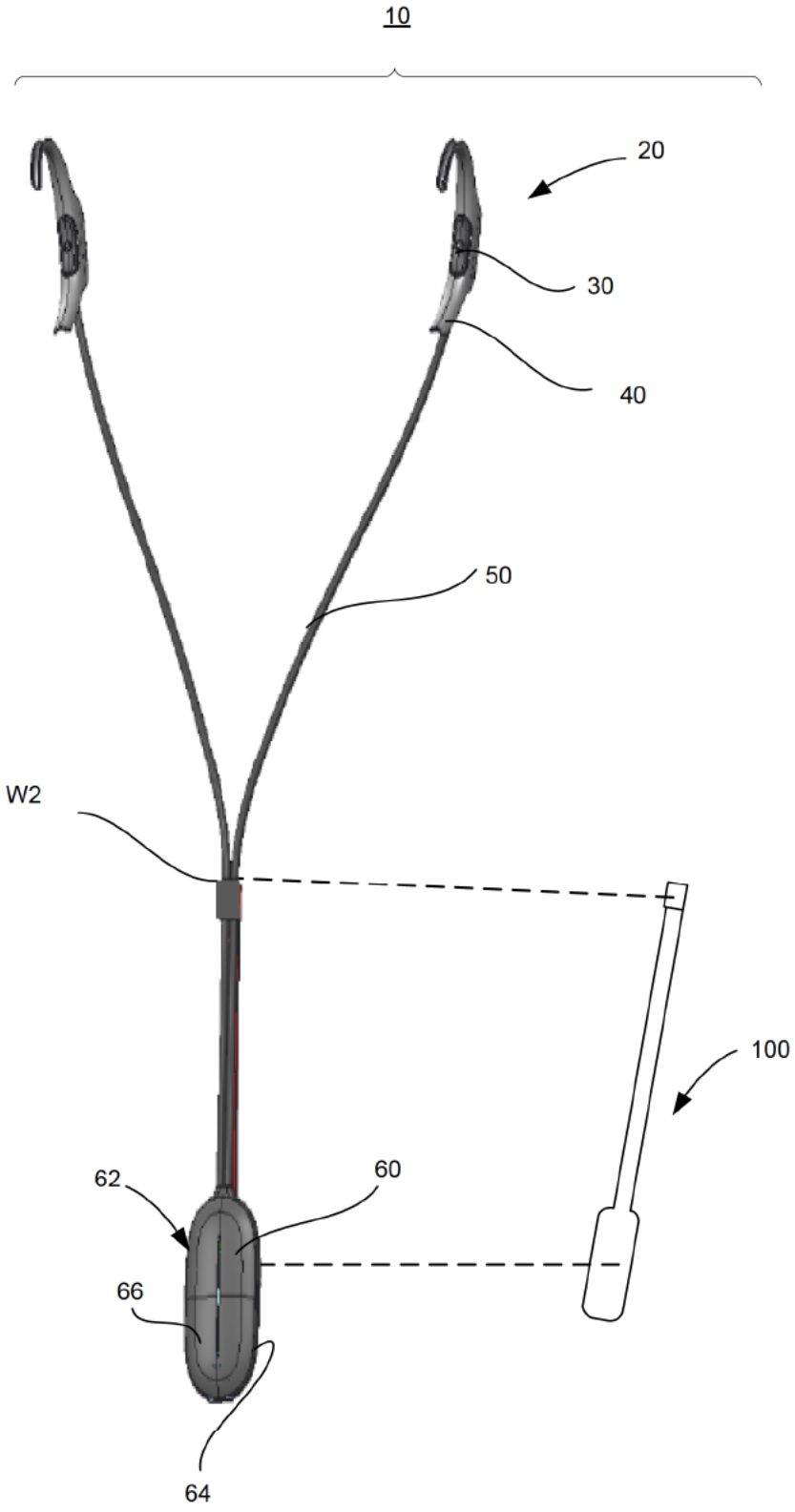

FIGURE 1

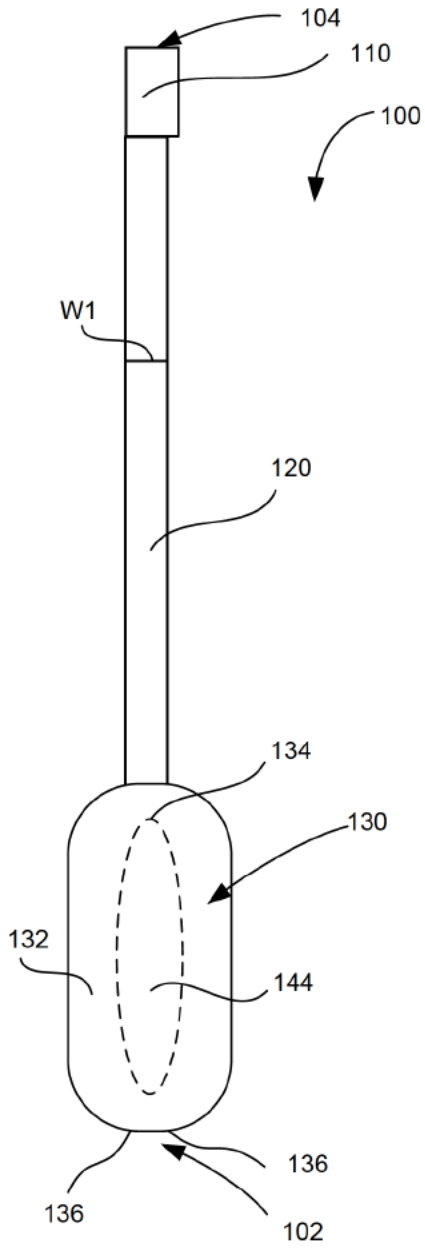

FIGURE 2

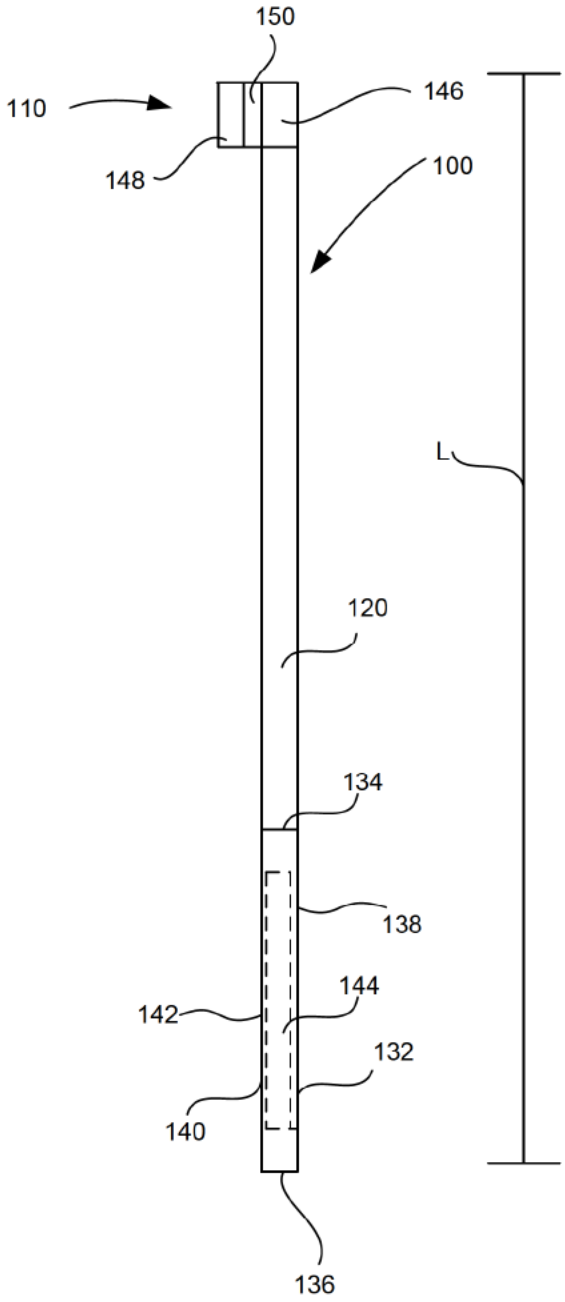

FIGURE 3

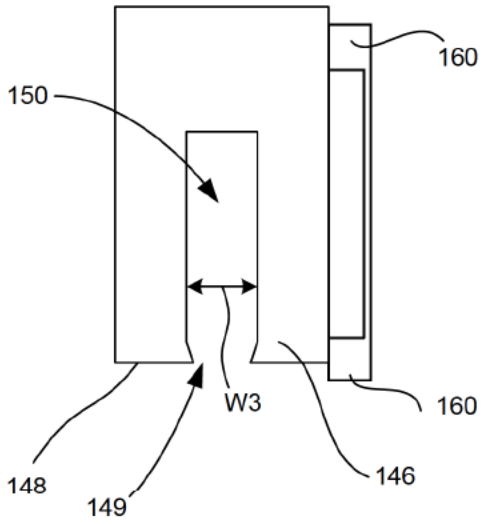

FIG. 3A

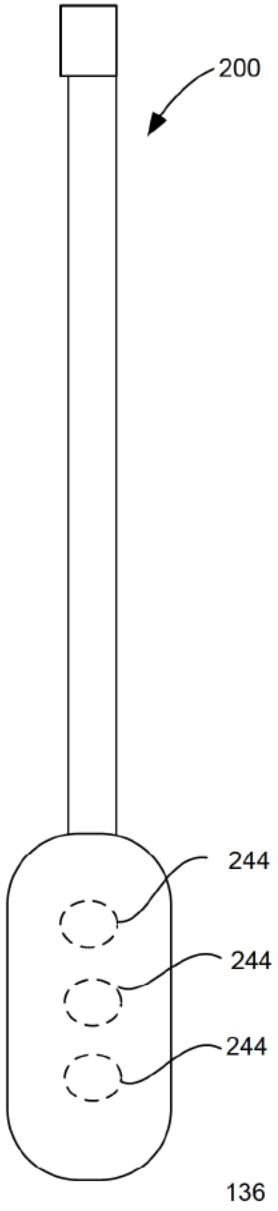

FIGURE 4

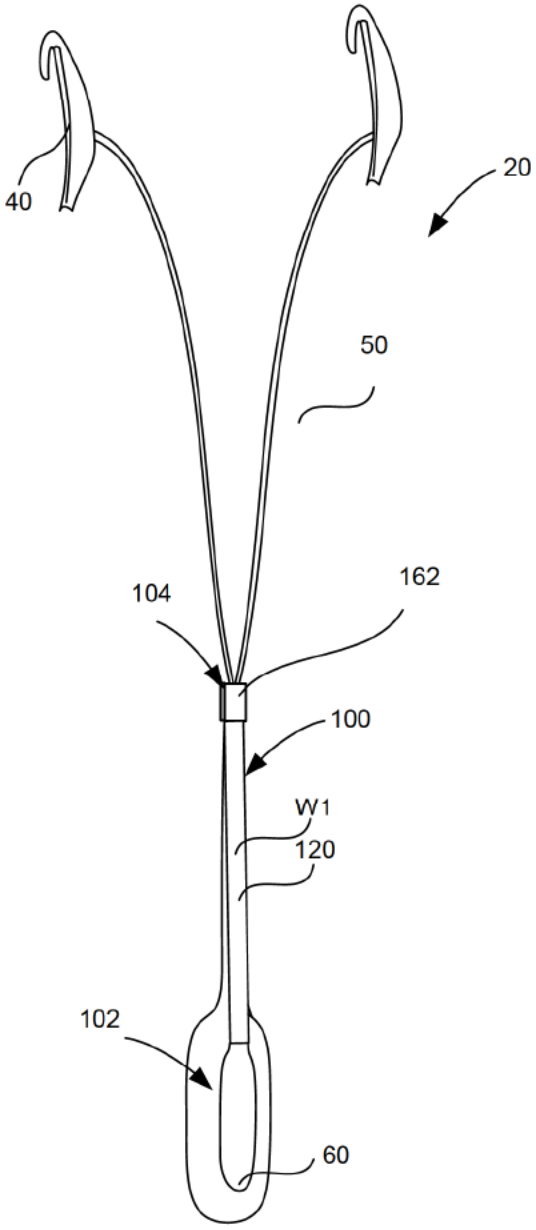

FIGURE 5

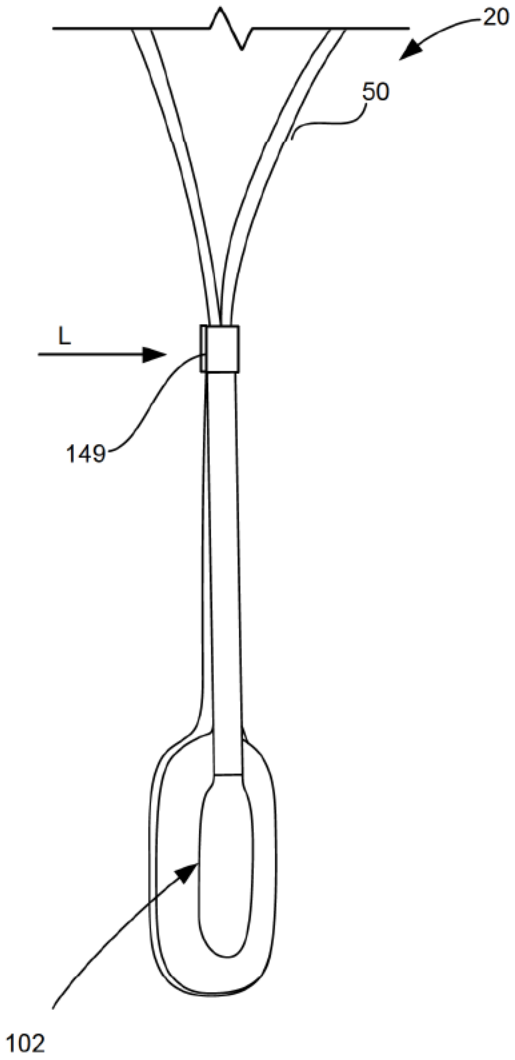

FIGURE 6

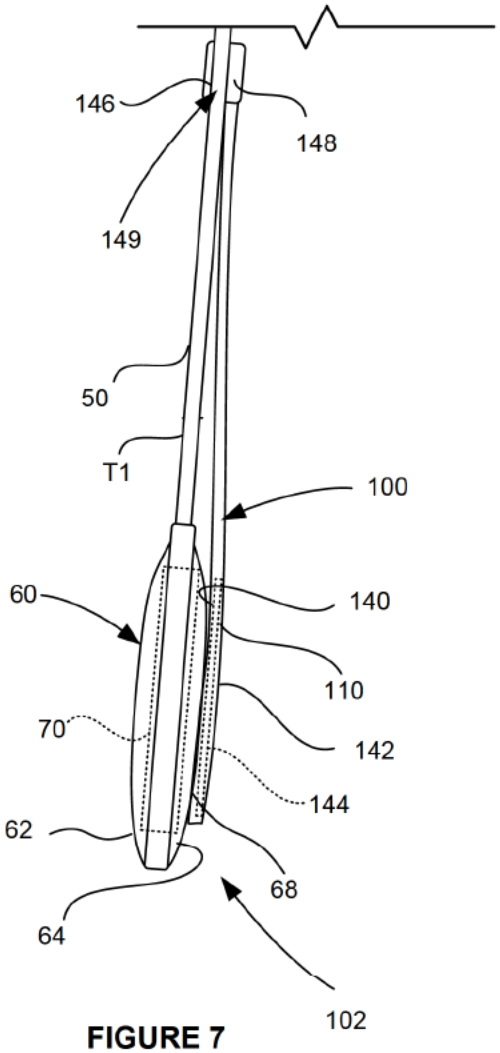

FIGURE 7

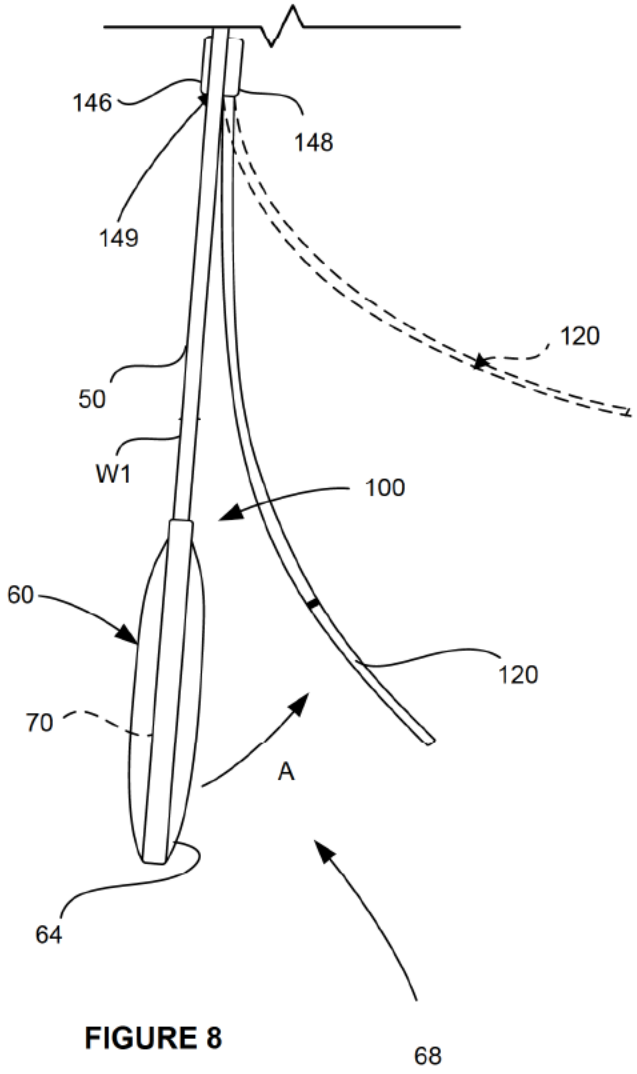

FIGURE 8

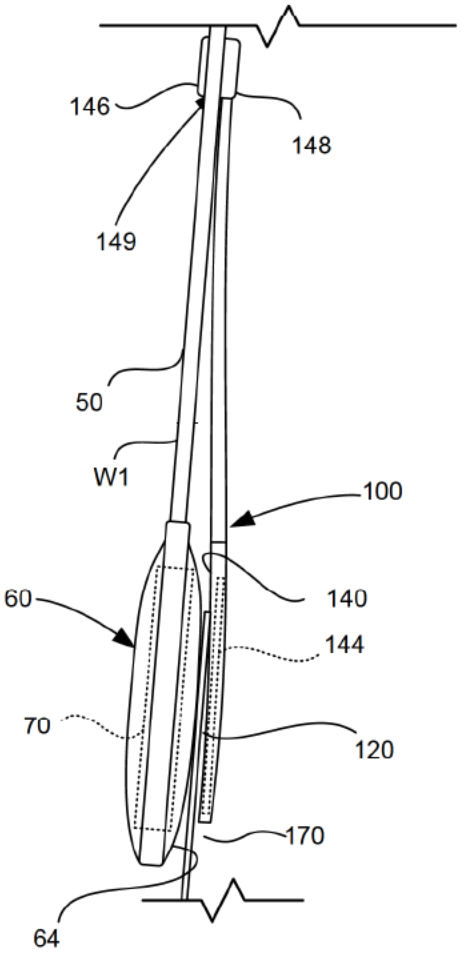

FIGURE 9

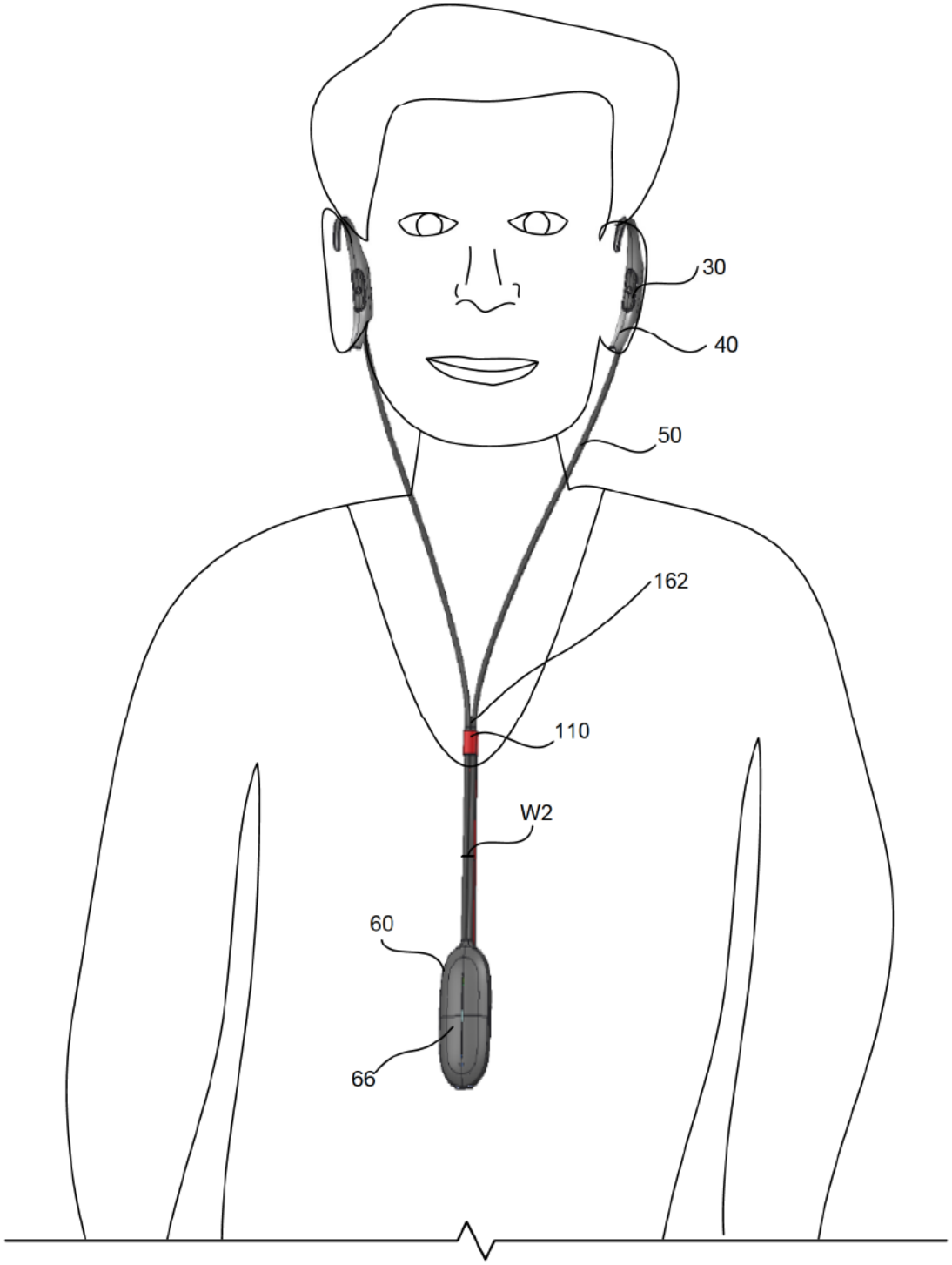

FIGURE 10