

2019

**PATENT ATTORNEYS
EXAMINATION**

PAPER E

Patent Attorney Practice in New Zealand
Including Interpretation and Criticism of Patent
Specifications

Regulation 158(1)(e)

Duration: 4 hours (plus 10 minutes for reading)

Question

Documents

- Description of client's product, with drawings.
- Accepted New Zealand patent application NZ 998877 owned by Burnham Pike Limited, filed with a complete specification in the first instance on 1 May 2018 and accepted on 1 June 2019.
- Prior art document US 4,902,120 (D1) published 20 February 1990.
- Prior art document US 5,327,178 (D2) published 5 July 1994.

Facts

You go to visit your client Kathryn Kirk at her workshop, and she shows you some prototypes of a product she has developed.

Kathryn's product is a combination of earphones and glasses, designed to be lightweight, easily adjustable, and to fit securely on the head of a wearer even when exercising. The earphones can be connected to an MP3 player, mobile phone, or other audio device. She is calling the product SpecPhonez. She has made two versions of the SpecPhonez and is trying to decide which she should bring to market.

Kathryn has done some prior art searching and has found patents claiming combinations of earphones and eyeglasses. However, she thinks that the SpecPhonez are different from anything else that has previously been developed.

A prior attempt at combining earphones and eyeglasses has involved a mechanism like a clamp or a clip that allows the earphones to be attached to any sort of eyeglass frame. However, Kathryn has tried this and has found that the connecting mechanism is awkward to fit and adjust to the head of the wearer, and leads to a loose and shaky fit. Also, there is no effective way to adjust the pressure exerted by the earphone on the wearer's ears and so the earphones soon become uncomfortable for the wearer.

In a prior device where it was attempted to combine the eyeglasses with the earphones in a single piece, the device failed to provide a proper adjustment means for the earphones and so also proved to be uncomfortable to the wearer.

While you're at Kathryn's workshop you meet Benjamin McCoy, one of her friends who says he has worked with her on the SpecPhonez. He tells you that he used to work for Burnham Pike Limited, which owns a patent application Kathryn is concerned about, NZ 998877. Benjamin tells you that he has tried to persuade Kathryn to adapt the SpecPhonez to allow for Bluetooth or Wifi connection with an audio device, but she isn't interested in doing this. She thinks there are difficulties with battery life and connectivity that would make her product unreliable.

Question

Kathryn asks you to advise her on whether either version of her SpecPhonez will infringe NZ 998877. To assist you she gives you a description of her product, and two of the patents she found in her prior art search.

Questions

Advise Kathryn on the following:

1. Would manufacture and sale of the SpecPhonez infringe patent NZ 998877 once granted? Consider all claims. 40 marks
2. What are Kathryn's options and grounds for challenging the validity of NZ 998877, and would she be successful? Consider all claims. 40 marks
3. What might Burnham Pike Limited do to improve its position? 5 marks
4. What would you recommend to Kathryn? What other issues should she be aware of, and what actions could she take to improve her position? 15 marks

Client's product description

My product is directed to a combination of eyeglasses with an integral earphone comprising an appropriate connection jack for use in connection with an audio or video device such as a digital audio (or MP3) player, portable radio, or CD player. The types of glasses can be eyeglasses with tinted lenses, prescription eyeglasses or glasses with plain clear lenses. The combination I've developed is lightweight and can be readily adjusted by the wearer for complete comfort during use.

I have developed two versions of my product, illustrated in the attached figures.

Version 1

As shown in Fig 1, the eyeglass frames 12 generally are comprised of a frame 14 containing the lenses 16 and two temple pieces 18. The temple pieces 18 are each connected to the frame 14 by means of a hinge 20. The hinge 20 allows the temple pieces 18 to be folded into position parallel to the frame 14 or perpendicular to the frame 14.

The general means of assembly of the temple pieces 18 is illustrated in Fig 2. As shown in Fig 3, the temple piece 18 comprises a temple arm piece 22 and a cover 24. The temple arm piece comprises two walls 26 that form an integral slot 28. The cover 24 will be held in place by a snap-fit positive engagement over the integral slot 28.

The product also comprises a speaker assembly 30 as illustrated in Figs 2 and 4. The speaker assembly comprises an earphone 32 with earphone wire 34. The earphone wire 34 will be adapted to be functionally received in an audio or video device. The earphone 32 will be mounted in a housing 36 by means of a snap fit or as an alternative the earphone 32 and housing 36 will be formed as an integral unit such as by bonding. An arm 38 will be connected to the rear of housing 36 by means of a snap fit or other method. The arm 38 is held in place on the temple 18 by means of a frictional fit under cover 24.

As shown in Figs 6A and 6B, the slot 28 will have an indexed surface 29 comprising a plurality of ridges 27. The arm 22 and/or cover 24 will have a plurality of metal pins 23 positioned therein. The user will move the arm 38 at a position along the longitudinal axis of temple piece 18 at a position that would comfortably fit the user's ear position by moving the arm back and forth. The position of the arm 38 will be maintained by the interaction between arm projection 39 and the ridges 27. Those of ordinary skill in the art will recognize that the positioning of the arm 38 can be accomplished by other means. For example, the arm 38 could be fitted with some sort of ball on its end that would fit into a depression in the walls 26 forming the slot 28 with the cover 24 still holding the arm 38 in the proper position.

Client's product description

The temple piece 18 also provides a means to effectively manage the placement and position of the earphone wire 34. In Version 1 of the product the wire 34 runs forward through aperture 36a and slot 28 and out toward the hinge 20 as shown in Fig 1.

The arm 38 is designed to be fabricated from a flexible semi-rigid material. One object of using such a material is to take advantage of the slight spring force created by the material. In this way, the spring force will be directed toward the user so that the earphone 32 will be held comfortably in position over the user's ear canal. As noted above, the arm 38 will slide longitudinally in the slot 28. However, the fit of the arm 38 into the slot 28 will prevent the arm 38 and also the earphone 32 from rotating about its axis. The prevention of rotation of the arm 38 is important to maintain the comfort of the user. However, the connection of the arm 38 to the housing 36 could provide for a slight pivoting motion so that the earphone 32 will comfortably fit the angle of the user's ear canal.

Version 2

As illustrated in Fig 5, the perspective view of Version 2, an alternative method of placing the wire 34 is to allow the wire 34 to run from the rear of earphone 32 of speaker assembly 30 without the wire being connected to the temple piece 18. In Fig 5, like reference numbers are used to indicate like parts to Version 1.

Client's product description

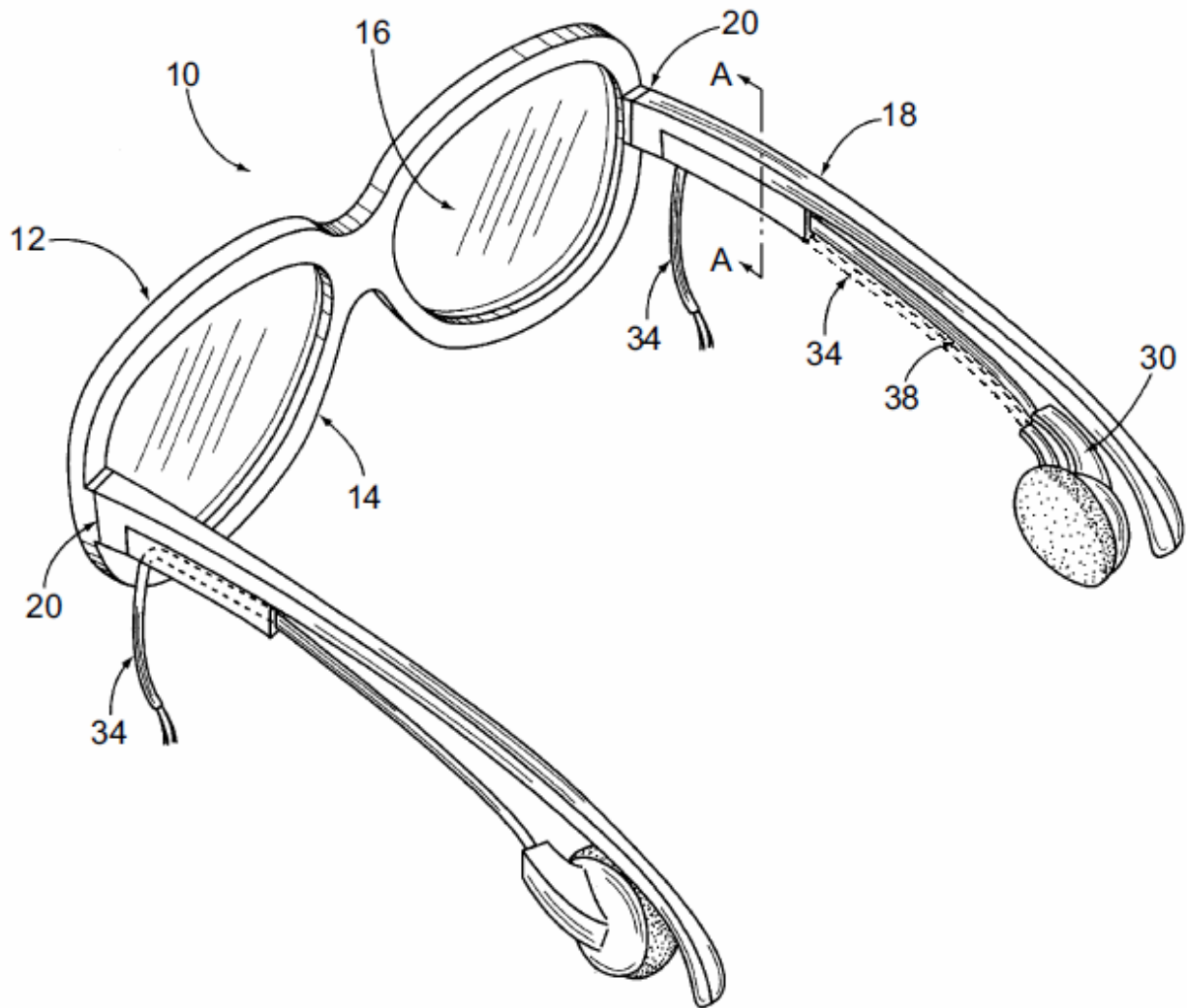


FIG. 1 - Perspective view
Version 1

Client's product description

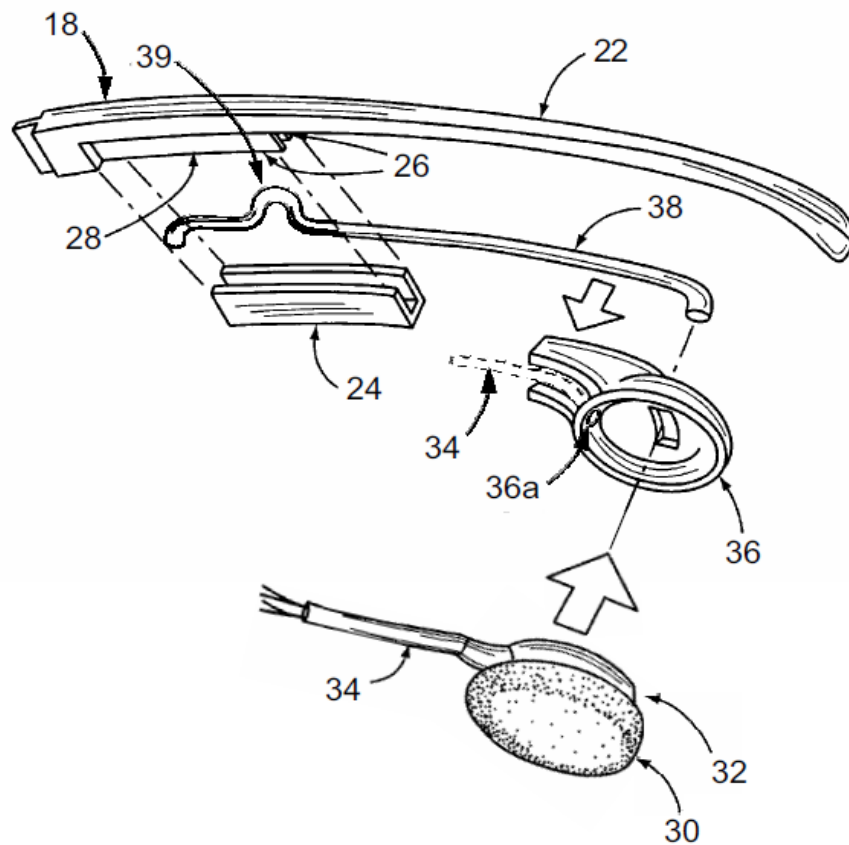


FIG. 2 - Exploded view
Version 1

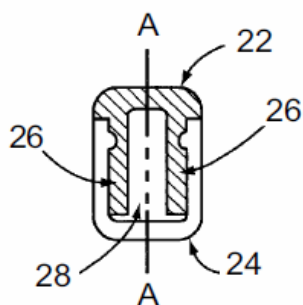


FIG. 3 - Section A-A
from Fig1

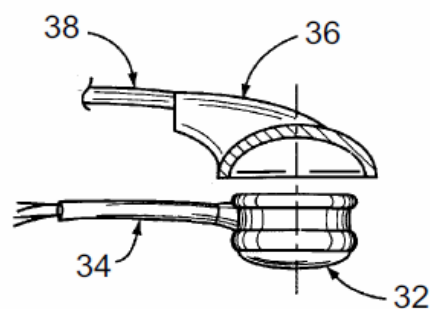


FIG. 4 - Overhead
section of part
of Version 1

Client's product description

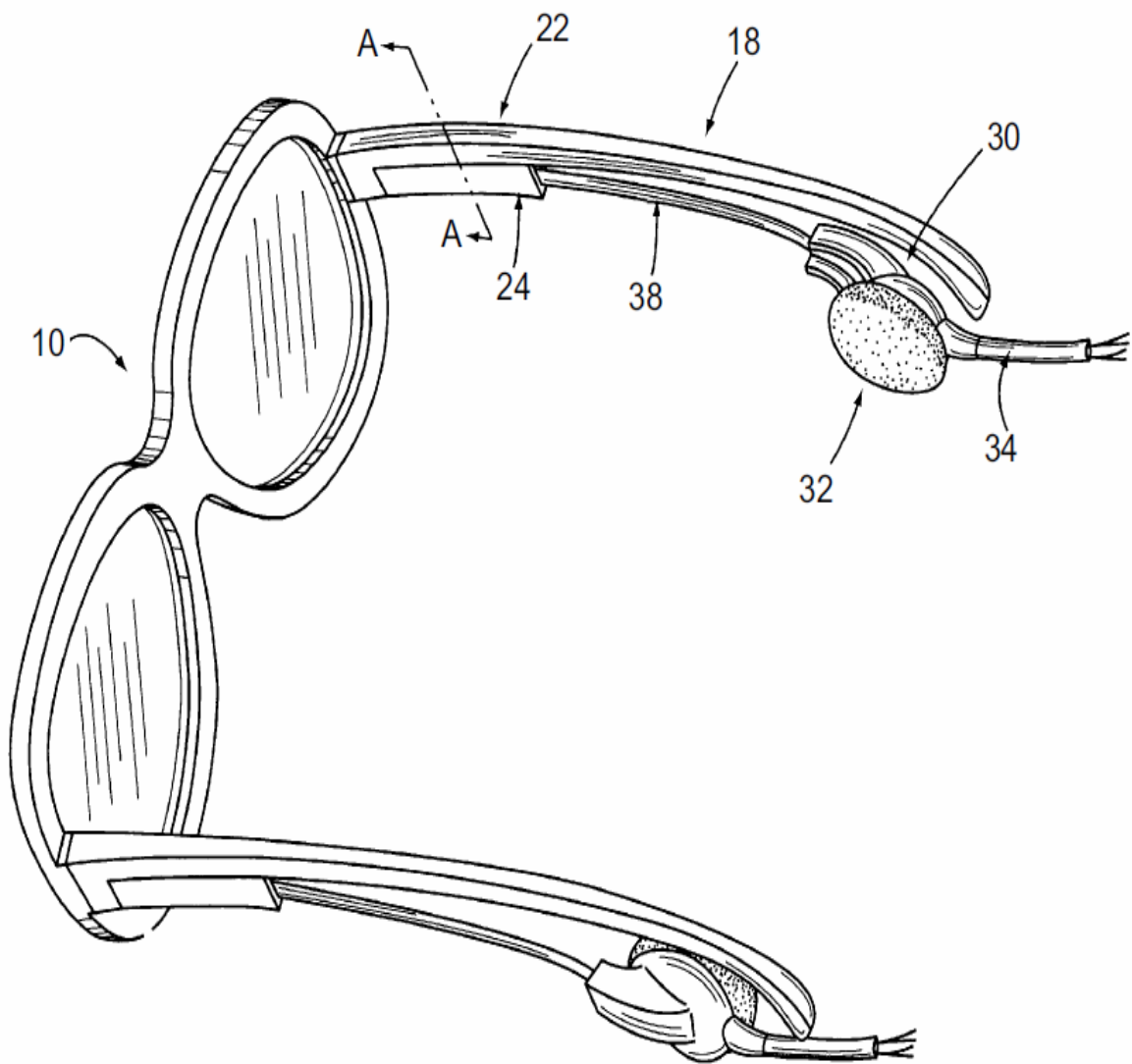


FIG. 5 - Perspective view
Version 2

Client's product description

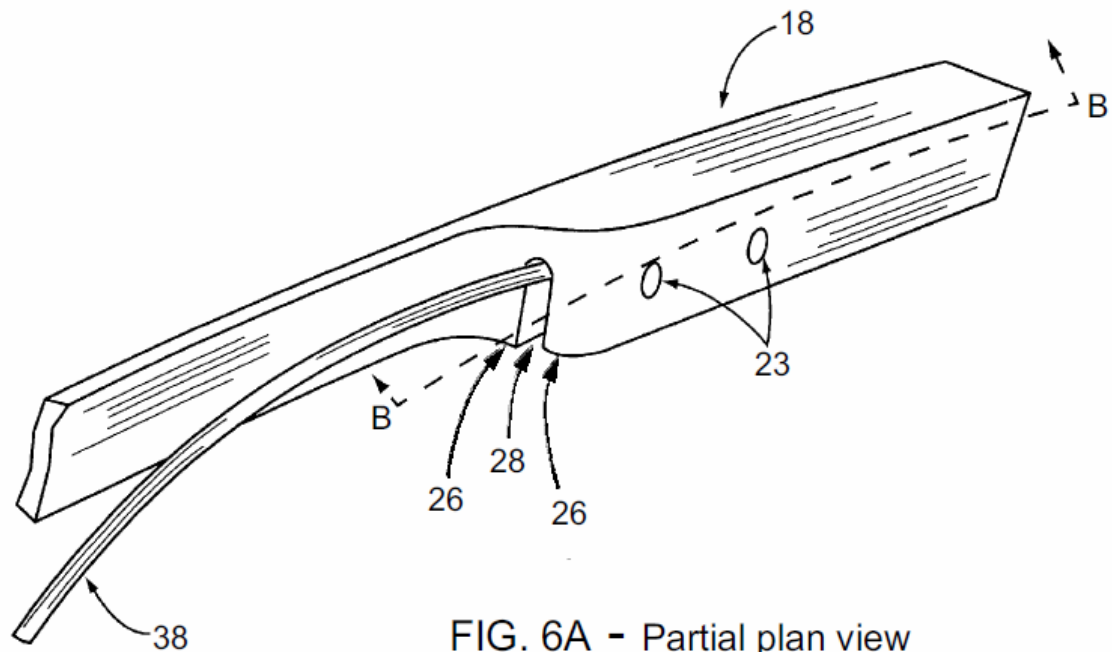


FIG. 6A - Partial plan view
Version 1 and 2

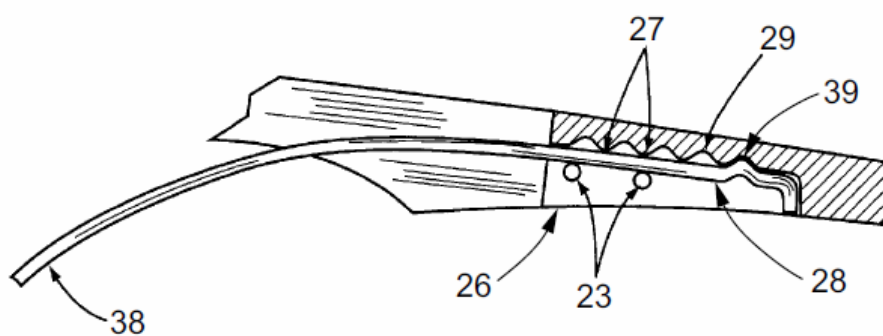


FIG. 6B - Section B-B
from Fig 6A

**COMBINATION MULTIPLE SUPPORTED VARIABLE POSITION AUDIO
INTAKE CONTROL DEVICES**

BACKGROUND OF THE INVENTION

5 The present invention relates to audio communication and more particularly to a sound intake control device and adjustable supports therefor.

Radios, tape players and other audio equipment have been miniaturised to such an extent that they may be conveniently carried on the person of a user, such as in a pocket or other portion of the wearer's clothing or accessories. Many diverse audio sources are now in use.

10 A need in terms of safety, further choice in listening capability, and the intake and/or blocking of external sounds has arisen. This device has been created to answer the needs of pilots, communications personnel, music lovers, airport linemen or anyone with the need to hear more than one audio source simultaneously and/or in regulated quantities or levels. This invention is designed to accurately achieve multiple source
15 sound (sound on sound), single source sound or no sound.

Presently and as technological and social change occur the demand for safety, utility and convenience are major considerations. A device which provides a means for greater discrimination of aural sources will aid many people who desire to listen, communicate and deal with sound more effectively.

20 This invention is also directed toward a means of providing high quality sound reproduction with the versatility to be utilized as a headset, earphones and/or hearing aid or earplugs. The device can be worn in combination with, or as a means to secure spectacles or headgear of the wearer. The design places the device where it can be utilized on a regular basis.

25 This invention is directed toward a manner of mounting miniature speakers or earphones to enhance their utility, versatility and minimize any inconvenience or discomfort as a result of the supporting components.

30 At present audio headsets and earphones are limited to a single position; existing headsets and earphones enclose the ear, are pressed adjacent to the ear, are placed in the outer ear, or, are positioned inside the auditory canal.

Prior art, due to this single position limitation, has the inherent effect of masking outside sounds with sound produced by the earphones. With respect to safety, the wearer is hindered in his ability to hear surrounding sounds such as instructions, warnings, automobiles, sirens, conversations etc.

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The most widely used, present design audio headset is awkward to wear and cumbersome to carry. Cord entanglement problems occur regularly and the resulting entanglement can cause short circuiting of speaker or microphone leads, as well as incur the bother and loss of time spent untangling headset wires.

- 5 Additional entanglement problems arise when the now common retainer cord used to suspend the glasses around the wearer's neck when not in use is worn simultaneously with the prior art headset.

Another difficulty involves the wearing of a hat, visor or helmet and a prior art headset simultaneously.

- 10 Since the majority of headsets in use today consist of a band, which transversely spans the head, a hat, helmet or visor does not fit the wearer's head properly when worn in combination with the headset. At present the small in ear-type headsets circumvent this problem however sound quality is sacrificed due to the extra small size of the speakers and they are limited to a single position.

- 15 Further shortcomings of prior art include the lack of single hand placement. Both hands are needed to place the headset or earphones in listening position.

Other prior art devices disclose speakers or earphones used as hearing aids for the hard of hearing some of which were supported by spectacles or constructed as a part thereof. In one example, the terminal end of the respective sidepiece or arm of the spectacles
20 supports a speaker.

- The present invention is distinctive over prior art devices by adjustably supporting a pair of miniature speakers on headgear or spectacle sidepieces which can be positioned in the ear, adjacent the ear or in varying distances from the ear as desired. The inherent design serves multiple functions and places the sound in the control device where it can
25 be safely heard, worn, transported and utilized more effectively.

A further advantage of the present invention is that it can be removed from spectacles and used on other spectacles or other means for use on the head of a user. When the invention is removed, the spectacles retain aesthetically pleasing side pieces.

- It is an object of this invention to provide a personal user supported audio unit
30 comprising a relatively inexpensive assembly of audio earphones easily connected with and supported by headgear or the sidepieces of any conventional pair of spectacles and which may be adjusted relative to the headgear or sidepiece either laterally longitudinally or vertically to position the ear-phones in a comfortable position adjacent or within the ear for maximum audio and which can enable the user to hear and identify
35 sounds from sources other than the audio set connected with the earphones.

SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided a personal audio unit for connection with an audio source, comprising:

a pair of speakers, each connectable to an audio source by a lead;

5 clamping means for attachment of the speakers with means for use on the head of a user, wherein the clamping means adjustably supports the respective speaker of the pair of speakers in variable positions;

flexible connectors extending between and connecting each speaker to the clamping means;

10 each speaker of said pair of speakers having a cylindrical portion with an aperture that receives an intermediate portion of the respective lead; and,

the clamping means surrounding an intermediate portion of the respective lead.

It is envisaged that the audio source may be a radio, an MP3 player, a mobile phone, or similar.

15 Preferably the means for use on the head of the user includes a pair of spectacles having sidepieces adapted for engaging a user's head adjacent the ears for supporting the spectacles. Each clamping means adjustably connects each speaker of said pair of speakers with the respective sidepiece of said spectacles for manual longitudinal adjustment along an intermediate portion of the respective sidepiece, each clamping
20 means also arranged to permit swinging movement of the respective speaker toward and away from a user's head.

More preferably, each flexible connector comprises an endless strap-like band.

Preferably, the speakers are arranged to be positioned forwardly and away from the user's ears, thereby allowing the user to clearly and simultaneously hear sounds coming
25 from the speakers as well as the sounds coming from external, ambient sources.

According to a further aspect of the invention there is provided a personal audio unit for connection with an audio source, comprising:

a pair of speakers, each connectable to an audio source by a lead;

30 clamping means for attachment of the speakers with means for use on the head of a user;

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a pair of spectacles for use on the head of a user and having sidepieces configured to be positioned adjacent and extending forwardly from the ears of the user; and,

5 a pair of elongated arm means connected at one end with the respective clamping means and at the other end with the respective speaker of the pair of speakers, wherein the pair of speakers is positionable in varying positions relative to the sidepieces.

Preferably, each clamping means adjustably supports the respective speaker in variable positions relative to the sidepieces.

10 Preferably, each elongated arm means comprises two arms slidably connected together at one end portion in longitudinal overlapping relation and connected at their other ends with the respective clamping means and speaker of said pair of speakers.

The clamping means may be removable from the means for use on the head of the user.

15 Horizontal movement of the speakers longitudinally of the sidepieces or headgear allows the user to position the speakers relative to the ear as desired. If very little external sound is desired to be heard, the user locates the speakers in or adjacent the ears. If more external sound is desired, the speakers are moved forwardly and away from the ears as necessary and the volume adjusted to attain the desired ratio of speaker and external sound mixing (sound on sound).

20 Vertical movement of the speakers relative to the glasses allows accurate positioning with respect to the ear for different individuals and different sidepieces. Additionally, the vertical movement can be utilized to perform the external sound versus speaker sound (sound on sound) adjustment as primarily achieved by the horizontal positioning.

25 The attachment to the spectacles or headgear allows the device to be placed near the ears safely and easily with only one hand because the spectacles or headgear are designed for single hand placement. This eliminates the cord entanglement aggravation caused when combining a headset with a spectacle retainer cord, by combining both devices into one apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

30 FIG. 1 is a perspective view of the device supported by a pair of spectacles;

FIG. 2 is a view similar to FIG. 1 illustrating spring clips supporting the device on the spectacle sidepiece;

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FIG. 3 is a fragmentary perspective view illustrating the manner of supporting the device on the user's visor or other head encircling band; and,

FIG. 4 is a fragmentary perspective view, illustrating another embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 The reference numeral 10 indicates the unit as a whole. The device 10 comprises a pair of conventional, commercially available miniature speakers 12 and 14 operatively connected with one end of audio leads 16 and 18, respectively, with the other end of the leads connected with a plug 20 in a conventional manner. Each of the speakers may include a cover 22 through which audio sounds are transmitted and an opposite or
10 rearward substantially cylindrical portion 24, having a vent 25, which receives and is connected with the above named one end portion of the respective audio lead. The respective cylindrical portion 24 is transversely apertured, as at 26, for frictionally receiving, in sliding relation, a portion of the respective audio lead adjacent its connected end to form an audio lead closed loop portion 28 which may be increased or reduced in
15 size to allow the speakers 12 or 14 to be moved vertically for adjustment purposes.

A flexible connector 30 is connected with each speaker loop 28. The flexible connectors 30 are preferably endless bands with juxtaposed portions of its wall surrounded and gripped in sliding relation by a tension adjuster 32 to define a substantially figure eight configuration.

20 The connectors 30 may be formed by an endless band or may be a strap-like length of flexible plastic material doubled back upon itself from both of its ends and secured together. A tension adjuster 32, transversely surrounding the connector band, is formed by a helically twisted length of wire, or the like, and defines oppositely disposed closed loops 34 and 36 at respective ends of the flexible connector. The loop 34 is engaged with
25 the speaker loop 28 in chain link fashion and the other loop 36 of the flexible connector transversely surrounds a respective one of a pair of spectacle sidepieces 38 intermediate its ends. The loop 36 allows horizontal movement of the speakers longitudinally of the respective sidepiece. Tension adjuster 32 can be moved to tighten and clamp the speaker assembly in place on sidepiece 38.

30 A tension adjuster member 32' also surrounds the audio leads 16 and 18 intermediate their ends for the purpose presently explained. A rheostat 50 is interposed in the leads 16 and 18 between the tension adjuster 32' and the plug 20 as a volume control. An alligator-type clip or clamp 52 is attached to the leads between the volume control 50 and the tension adjuster 32' for supporting the volume control in a convenient location
35 as by attaching the clamp 52 to a portion of the user's clothing 54.

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Referring also to FIGS. 2 and 3, the reference numerals 40 and 41 indicate a pair of spring clips or clamps which may be used in place of the connectors 30. This is accomplished by permanent attachment of the clamp to the speaker cord or manually opening the respective spring clamp so that the speaker cord loop 28 is received
5 between the gripping end portion 42 of the clamp and its spring closed hinged connection 44 so that the respective speaker 12 or 14 is then supported in depending relation from the respective clamp. The clamp gripping end 42 is then disposed on opposing sides of the respective spectacle sidepiece 38 at a selected location intermediate its length.

10 In the event the user of the device does not wear spectacles, the clamps 40 permit attachment to other headgear, such as the sweatband of a hat or headband (not shown), or the band of a visor, as indicated at 46 (FIG. 3). The respective clamp 40 and 41 is positioned as shown with its gripping end edge 42 gripping opposing sides of the depending edge portion of the visor band 48.

15 Referring more particularly to FIG. 4 other clamps 60, only one being shown, similarly gripping the spectacle earpieces 38, support similar speakers 62 in cantilever fashion by arm means 64. A pad 63 surrounds the major portion of the speaker. In the example shown the arm means 64 comprises a forward bar 66 rigidly attached at one end to the clamp 60 opposite its gripping end portion 68 and longitudinally slidably attached at its
20 other end portion to the forward end portion of a rearward arm 70 having its opposite or rearward end rigidly secured to the speaker 62. This permits vertical adjustment of the speaker relative to the sidepiece 38 and the user's ear, not shown, by the angular position of the clamp 60 relative to the longitudinal axis of the side-piece. Forward and rearward adjustment of the speaker 62 relative to the sidepiece and the user's ear is
25 achieved primarily by the sliding movement of the arm 70 relative to the bar 66 and secondly by the position of the clamp 60 longitudinally of the sidepiece. It seems obvious that the arm 70 may serve as a gooseneck having a ball at its rearward end cooperatively received by a socket formed in the housing supporting the speaker components to impart substantially all the advantages of ball and socket movement of
30 the speaker 62 relative to the user's ear, if desired.

In use the flexible connectors 30 have their free loop ends 36 transversely surrounding the respective spectacle sidepiece. With the spectacles in wearing position, the speakers are adjusted by moving the flexible connectors 30 longitudinally of the respective
35 sidepiece so that the speakers are positioned relative to the user's ear in a desired position in accordance with other parameters which may or may not be limiting the user's attention. The same can be achieved by adjusting the position of the clamp 42 or 68 relative to the spectacle sidepiece. For example, the speakers may be positioned so

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that a desired audio program may be heard and yet other sounds may also be received, such as automobiles, warnings, instructions or the conversations of others.

By moving the adjuster 32 toward the respective side piece the size of the loop 36 is reduced to grip the side-piece so the speakers are frictionally maintained adjacent or in
5 the user's audio canal, as desired. The speakers may be positioned independently of each other to further enhance listening capabilities.

The strap-like configuration of the connectors 30, in combination with a small size for the loop 34, prevents angular rotation of either speaker about a vertical axis through the
10 respective connector 30. The coefficient of sliding friction between the connector loop 36 and the surface of the sidepiece 38 prevents movement of one component relative to the other except as manually induced. The speakers are easily adjusted vertically relative to the sidepieces or the user's ears by increasing or decreasing the size of the lead loop 28. Further, if the user desires the speakers to be in close proximity to the ear the lead
15 adjuster 32' may be moved longitudinally of the leads until disposed in underlying relation with respect to the user's chin to place a slight tension on the leads 16 and 18 and draw the speakers inwardly toward each other.

Alternatively, the leads may be positioned rearwardly of the user's head and the adjuster 32' disposed adjacent the back of the head to maintain the speakers adjacent the ears
20 and to maintain the spectacles in place on the face of the user. In this position the speaker assembly 10 may also be employed to support the spectacles in a position hanging from the user's neck.

It seems obvious that the spring clamps 40 and 41 may be connected with the lead loops 28, as described hereinabove, for use with the headgear as desired.

Obviously the invention is susceptible to changes or alterations without defeating its
25 practicability. Therefore, we do not wish to be confined to the preferred embodiment shown in the drawings and described herein.

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We claim:

1. A personal audio unit for connection with an audio source, comprising:
 - a pair of speakers, each connectable to an audio source by a lead;
 - clamping means for attachment of the speakers with means for use on the head of a user, wherein the clamping means adjustably supports the respective speaker of the pair of speakers in variable positions;
 - flexible connectors extending between and connecting each speaker to the clamping means;
 - each speaker of said pair of speakers having a portion with an aperture that receives an intermediate portion of the respective lead; and,
 - the clamping means surrounding an intermediate portion of the respective lead.
2. The audio unit according to claim 1 in which the means for use on the head of the user includes a pair of spectacles having sidepieces adapted for engaging a user's head adjacent the ears for supporting the spectacles; and wherein each clamping means adjustably connects each speaker of said pair of speakers with the respective sidepiece of said spectacles for manual longitudinal adjustment along an intermediate portion of the respective sidepiece, each clamping means also arranged to permit swinging movement of the respective speaker toward and away from a user's head.
3. The combination according to claim 1 in which each flexible connector comprises an endless strap-like band.
4. A personal audio unit as claimed in claim 1, wherein the speakers are arranged to be positioned forwardly and away from the user's ears, thereby allowing the user to clearly and simultaneously hear sounds coming from the speakers as well as the sounds coming from external, ambient sources.
5. A personal audio unit for connection with an audio source, comprising:
 - a pair of speakers, each connectable to an audio source by a lead;
 - clamping means for attachment of the speakers with means for use on the head of a user;
 - a pair of spectacles for use on the head of a user and having sidepieces configured to be positioned adjacent and extending forwardly from the ears of the user; and

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a pair of elongated arm means connected at one end with the respective clamping means and at the other end with the respective speaker of the pair of speakers, wherein the pair of speakers is positionable in varying positions relative to the sidepieces.

6. A personal audio unit as claimed in claim 5, wherein each clamping means adjustably supports the respective speaker in variable positions relative to the sidepieces.
7. A personal audio device according to claim 1 or 5, wherein the clamping means are removable from the means for use on the head of the user.

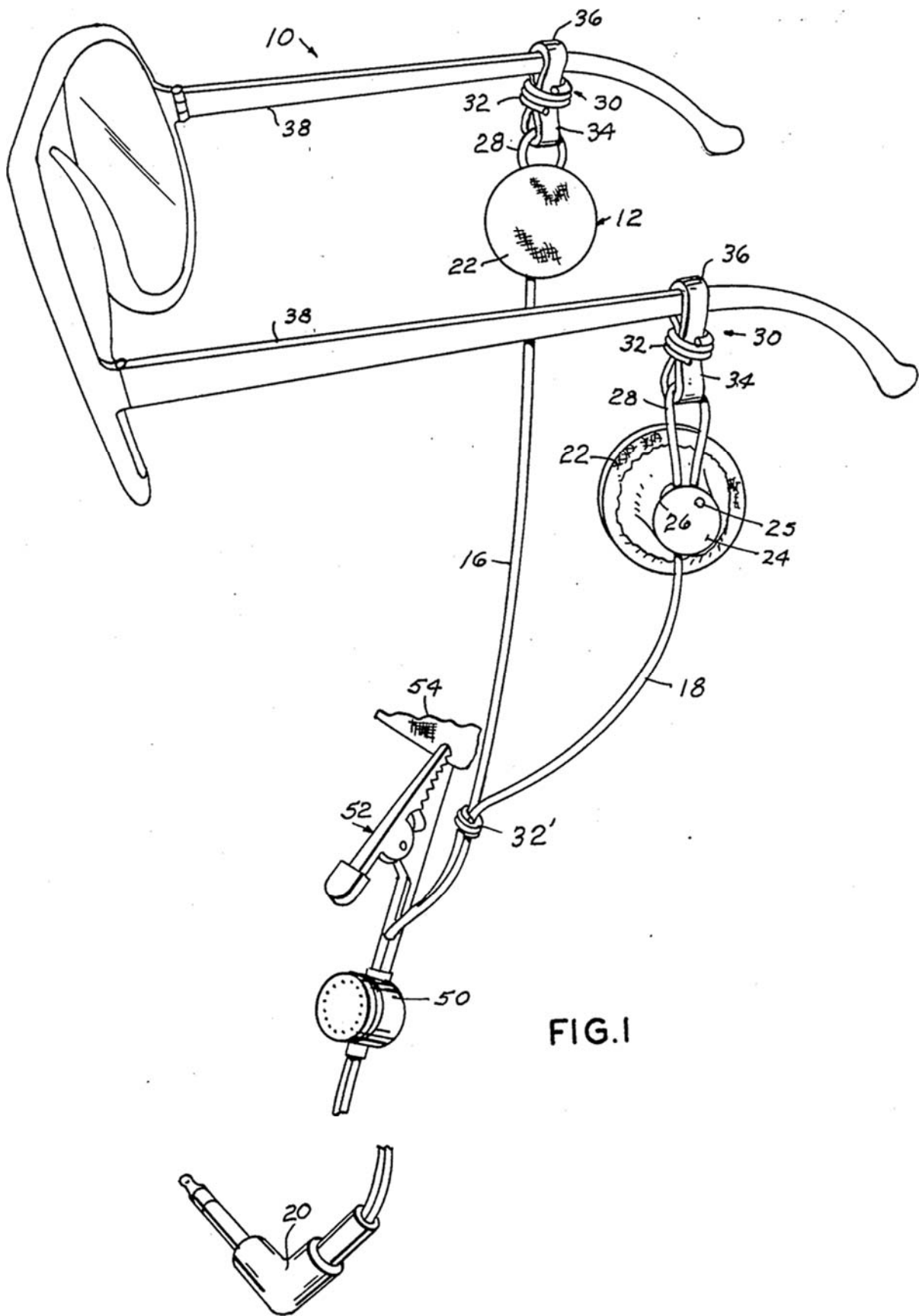


FIG.1

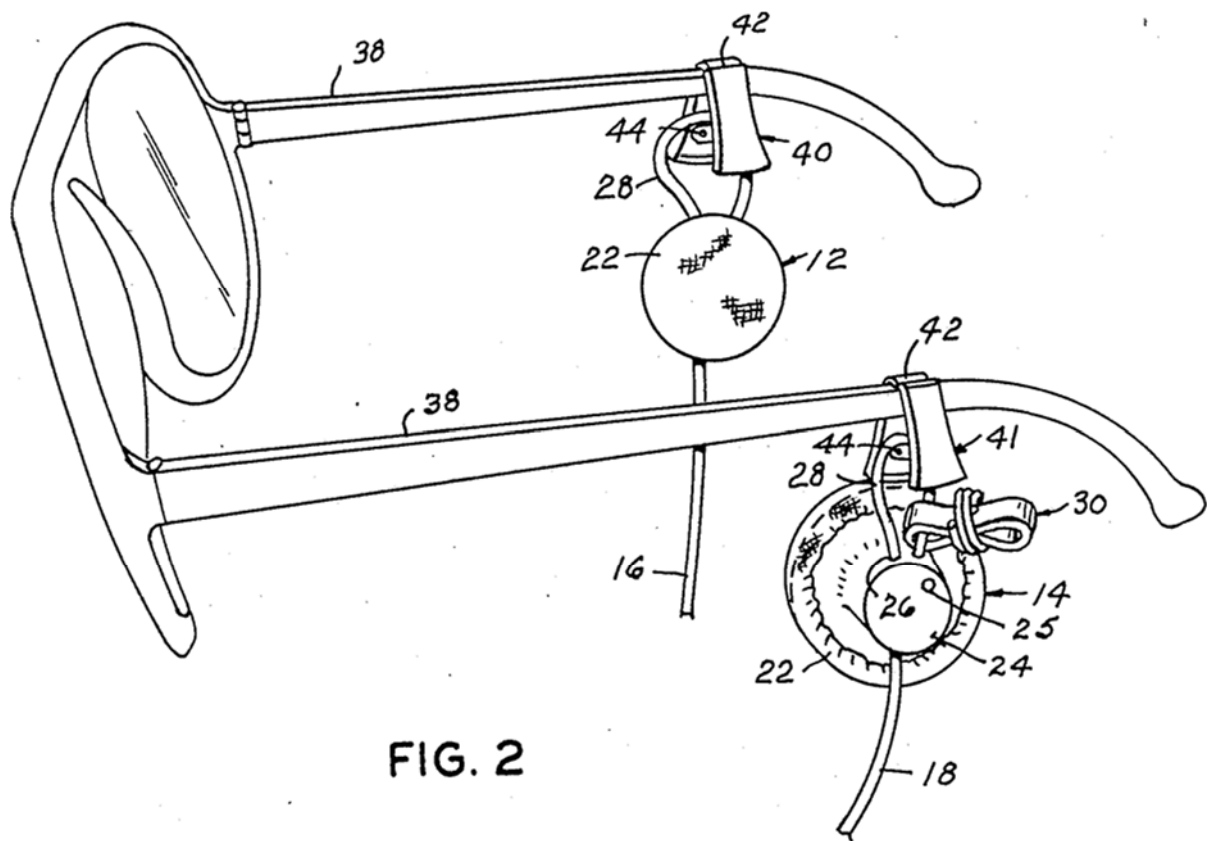


FIG. 2

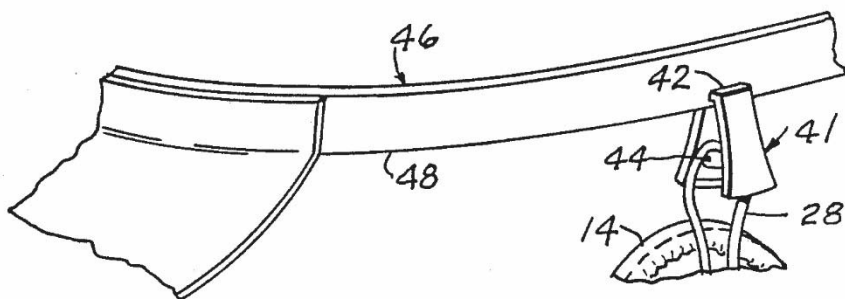


FIG. 3

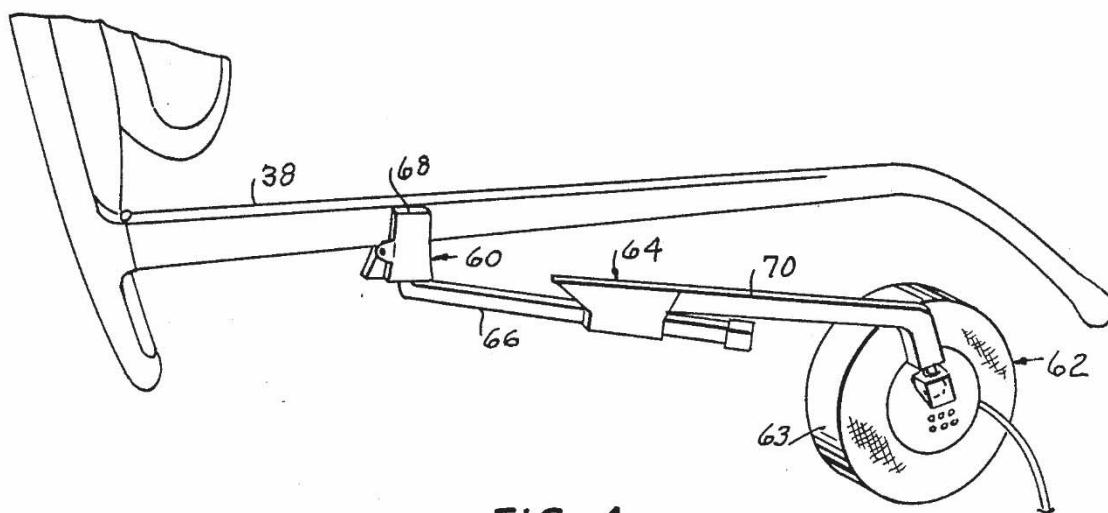


FIG. 4

United States Patent [19]
Weyer

[11] **Patent Number:** 4,902,120
[45] **Date of Patent:** Feb. 20, 1990

[54] **EYEGGLASS HEADPHONES**

[76] **Inventor:** Frank M. Weyer, 81 Toilsome Ave.,
Norwalk, Conn. 06851

[21] **Appl. No.:** 274,491

[22] **Filed:** Nov. 22, 1988

[51] **Int. Cl.⁴** G02C 1/00

[52] **U.S. Cl.** 351/158; 351/41

[58] **Field of Search** 351/41, 111, 158

[56] **References Cited**

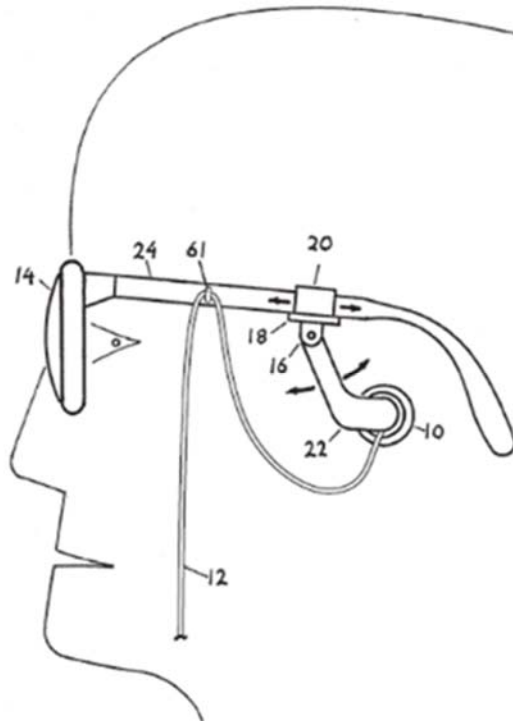
FOREIGN PATENT DOCUMENTS

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0113912 7/1983 Japan 351/158

Primary Examiner—Rodney B. Bovernick

[57] **ABSTRACT**

Means for attaching personal stereo headphones to eyeglass frames. Eyeglasses incorporating personal stereo headphones attached to the eyeglass temples with the headphones leads contained in a neckstrap.



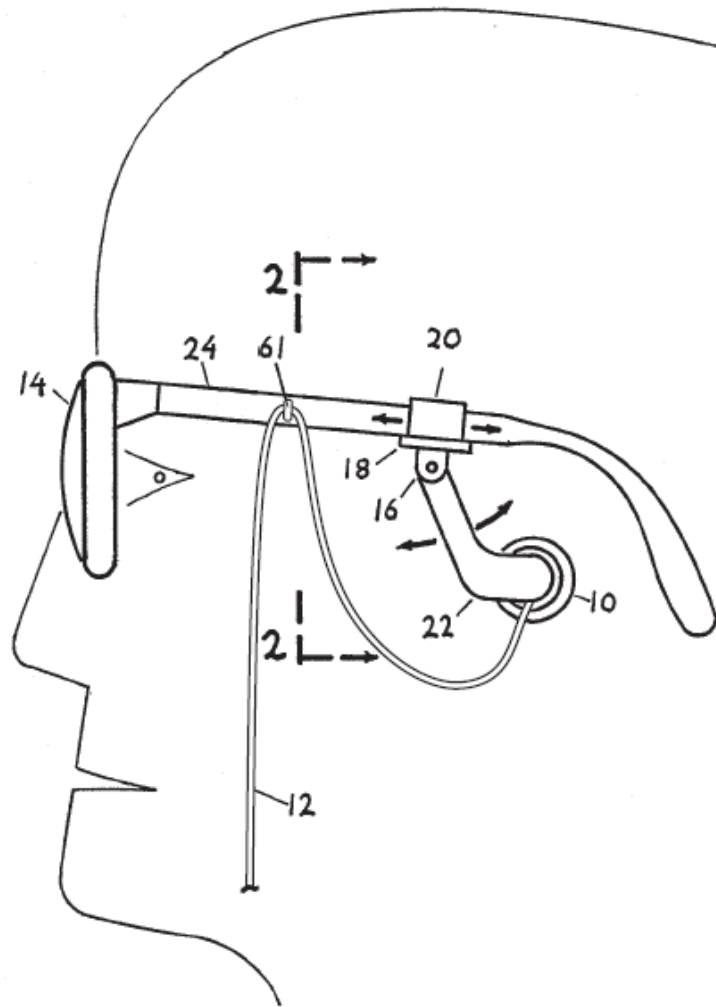


FIG. 1

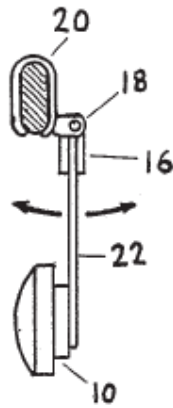


FIG. 2

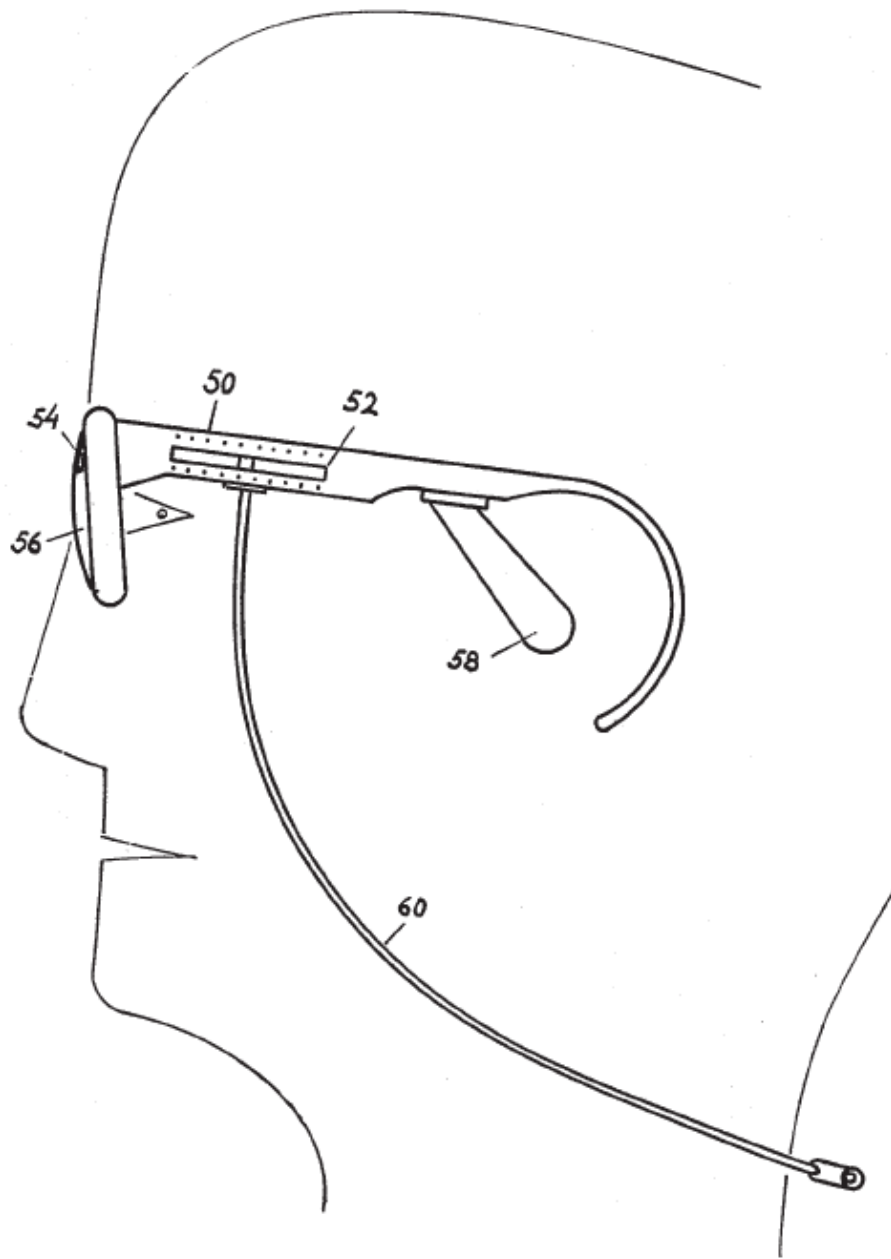


FIG. 3

EYEGLOSS HEADPHONES

BACKGROUND OF THE INVENTION

Over the past several years, personal portable stereos such as the "Sony Walkman (Reg. TM)" have become very popular. These personal stereos generally consist of a small radio or cassette player unit, generally about the size of a standard audio cassette tape (some radio- only units are as small as credit cards) together with a set of lightweight headphones. The headphones are attached to the radio or cassette player unit by a pair of long, thin wires and a standard stereo headphone plug.

The most common headphones consist of two foam- padded ear pieces attached to a flexible metal headband. These headphones work quite well. They are, however, unsightly, and cannot be worn under hats.

A second type of headphone is known as an "in-the- ear" headphone. This type of headphone consists of two small earpieces designed to fit inside the outer ear. No other means are used to maintain the earpieces in place. These headphones are less unsightly than the flexible headband type, although the wires dangling from the earpieces are also not very attractive. In addition, the earpieces tend to fall out of the ear, especially during physical activities such as jogging. Furthermore, the wires leading to the earpieces tend to tangle when removed from the ears, causing a great deal of inconvenience.

Over the last few years, sunglasses have once again become very popular. One type of sunglasses, popularized by such TV shows as "Magnum P.I." and "Miami Vice" comprises a neck-strap attached to the temples of the sunglasses. These are considered stylish, and allow the sunglasses to be worn like a necklace when they are not used to shield the eyes.

SUMMARY OF THE INVENTION

The first embodiment of the present invention comprises a clip for attaching the earpieces for personal stereos to eyeglasses or sunglasses. This embodiment eliminates the need for an unsightly headband, can be worn with a hat, and maintains the earpieces in position even during jogging or other physical activities.

The second embodiment of the present invention comprises sunglasses incorporating a radio and headphones in a single unit. This embodiment may also incorporate photovoltaic regions in the sunglass lenses.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a pair of eyeglasses to which the headphone clip of the present invention is attached.

FIG. 2 is a close-up sectional view along line A—A in FIG. 1 showing how the headphone clip is attached to the eyeglasses.

FIG. 3 is a side view of sunglasses of the present invention also incorporating a radio receiver in the sunglass frame.

DETAILED DESCRIPTION OF THE INVENTION

The first embodiment of the present invention is shown in FIG. 1. It comprises a clip for attaching a headphone earpiece 10 to an eyeglass frame 14. In the embodiment shown, the clip comprises a channel section 20, the cross-section of which is shown in FIG. 2, that clips over a sidepiece 24 (called the "temple") of the eyeglasses. The channel section 20 is slideable along the temple. The earpiece 10 is attached to an arm 22. In the embodiment shown, the arm is attached to the channel section 20 by means of pivoting sections 16 and 18, which allow for adjustment of the earpiece 10 position relative to the sidepiece 24 in the directions of the arrows shown in FIG. 1 and FIG. 2. However, arm 22 may also be made of a flexible material that allows positioning without the need for pivots, and may be directly connected or integrally formed with channel section 20.

Headphone lead 12 leads from the earpiece 10 to the personal stereo unit, which is not shown.

The headphone lead 12 extends through a support ring 61 on the sidepiece 24, and can slide through the ring 61 as the position of the headphone earpiece is adjusted along the sidepiece 24.

Although only one sidepiece 24 and earpiece 10 is shown, it will be appreciated that both sidepieces 24 of the eyeglass frame 14 may have earpieces 10 mounted in the same way shown and described.

FIG. 3 shows a further embodiment of the eyeglasses of the invention in which a radio receiver is incorporated in the eyeglass frame. The miniature circuits used are well known in the art. The components of the radio receiver may be mounted in the temples and the browpiece of the eyeglasses in a variety of configurations. In the embodiment shown in FIG. 3, a sliding control 52, either a volume control or a tuning control, is mounted on each of the temples 50. A region of photovoltaic cells 54 may be incorporated in the eyeglass lenses 56 or mounted elsewhere on the frame of the glasses to help power the radio receiver. The radio circuitry may also comprise a transceiver circuit, and the earpiece 58 may include an in-the-ear microphone, as is known in the art, allowing the eyeglasses to function as a personal communications device.

This embodiment may or may not include neckstrap 60 allowing the glasses to be used with external personal stereo devices.

Other embodiments incorporating the inventive features of the present invention will be apparent to those skilled in the art.

I claim:

1. Earpiece support means for attaching headphone earpiece means to temples of eyeglasses comprising:
attachment means attachable to and slidably mounted on said temples; and

positioning arm means pivotally attached to said attachment means, said positioning arm means comprising headphone earpiece means, said positioning arm means capable of adjustably positioning, maintaining and supporting said headphone earpiece means adjacent to an eyeglass wearer's ear.



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[54] **STEREO SPEAKERS MOUNTED ON HEAD**
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Related U.S. Application Data

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 abandoned.

[51] **Int. Cl.⁵** G02C 1/00; H04M 1/05
 [52] **U.S. Cl.** 351/158; 381/183
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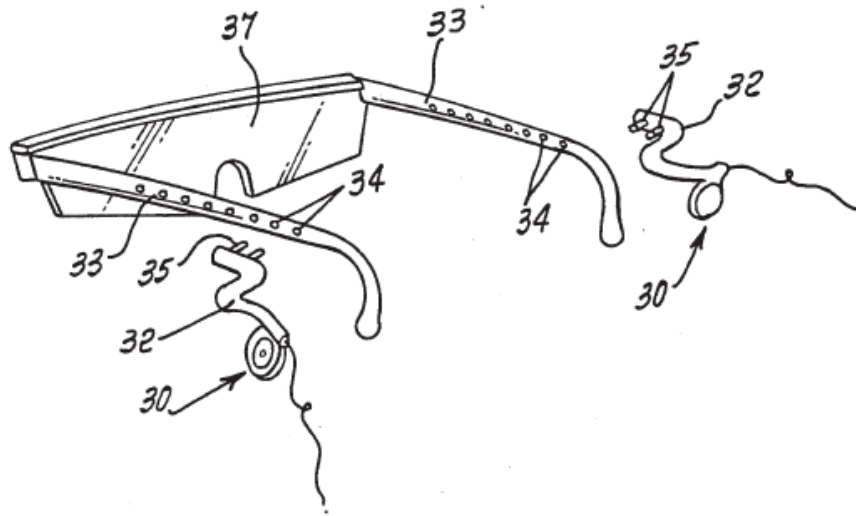


FIG. 1

STEREO SPEAKERS MOUNTED ON HEAD

BACKGROUND OF THE INVENTION

This application is a continuation in part of Ser. No. 07/716,395 filed Jun. 17, 1991, now abandoned.

This invention relates generally to an audio signal loudspeaker or loudspeakers carried by a human head, and more particularly to simple, effective support or positioning of such a speaker or speakers to optimize reception by the user's ear of sounds from both the speaker or speakers, and also from other sound sources.

Personal portable stereo equipment is now very popular with people from many walks of life. Current personal portable stereos allow the user to listen to music easily, no matter where he or she goes, as in athletic activities, such as jogging and biking. There are two types of lightweight, personal stereo headphones currently in use. The first is the foam, "over-the-ear" device that includes a lightweight headband, two foam-covered speakers, and flexible leads connecting to the audio source. Problems associated with such devices include their unsightliness as they resemble ear muffs. Also, the flexible metal band that connects the speakers prohibits the user from wearing a hat or helmet. Lastly, since the speakers completely cover both ears for maximum audio clarity, no exterior sounds can be heard, thereby making the user oblivious to his surrounding environment and placing him in danger from a variety of sources.

The second type of portable stereo headphone device is the "in-the-ear" model. This type of speaker does not necessarily need a restraining metal band, so each speaker is separate. The very small speaker is placed inside the ear canal and remains there by forcefully being wedged into the small opening of the inner ear. Such a speaker is uncomfortable to the user if worn for any length of time. Furthermore, if the user is participating in athletic activity, it is difficult to keep the speaker in place, and it frequently falls out of the ear. The user usually resorts to jamming the speaker even further into the ear, causing much pain. Also, like the over-the-ear speakers, the in-the-ear speaker inhibits the user from hearing exterior sounds, making this type of speaker dangerous as well.

A new danger has arisen with the increasing popularity of car telephones. When using a car phone, an automobile operator's attention is not where it should be, on the road. The user in most cases must use one hand to hold the phone and one for driving. Some speaker phones that allow hands-free operation are available on the market, but they severely lack audio clarity and quality. Also on the market is a directional microphone that affixes to the car to be used with a car phone. The microphone points toward the user's head and picks up his voice, eliminating the need for a hand-held microphone unit. What is needed is a speaker system to be used in conjunction with such a microphone, and that allows the user to hear the other phone user without blocking environmental sounds around the automobile, such as sirens, horns, etc.

Aside from the above-mentioned problems associated with Moore's and Weyer's headphones, the safety factor of wearing such headphones is an unsolved problem. Bikers, Joggers, or automobile operators wearing such devices cannot hear what is going on around them, such as sirens, voices, horns, etc. California State Law prohibits automobile operators and bicycle riders from wearing such devices as when using their vehicles.

Nevertheless, infractions of the law are common. This is caused by the fact that people enjoy privately listening to music as they drive or pursue athletic activities. Since there is no alternative speaker on the market, people choose to break the law and put themselves and others at great danger rather than go

without their personal stereos. What is needed is a speaker assembly that is of high quality, comfortable to wear, securely attachable to the head for vigorous activity, and most importantly, one that allows the user to hear sounds from the worn audio source as well as exterior sounds emanating from the surrounding environment. There is also need for an adjustment system that prevents the speaker from blocking the ear opening and cutting off environmental sounds.

SUMMARY OF THE INVENTION

It is a major object of the invention to provide an improved loudspeaker system, and associated equipment, meeting the above need. Basically, the invention is embodied in a combination with a support member attachable to an upper portion of the user's head and that extends generally forwardly toward the user's face, of the improvement comprising

- a) a first loudspeaker carried by the member in offset, proximate relation to the ear opening of one of the user's ears, the loudspeaker having an input to receive electrical signals from an audio source,
- b) the speaker having an audio output side, and the offset relation characterized in that said output side faces toward the ear opening and has spacing from that opening by an amount between about 1/2 and 1 inch when the member is attached to the user's head.

It is another object of the invention to provide the support member in the form of an eyeglass ear stem, to which the support member may be integrally or adjustably connected.

In one embodiment of the invention, a detachable speaker assembly is used in conjunction with a specially prepared ear stem, made to accept the speakers. This embodiment is convenient for the user since the speaker assembly may be removed when not in use, or when attachment is not desired.

Yet another object is the provision of removable attachment of a loudspeaker to an eyeglass stem by pin and hole elements, one on the member and the other on the stem.

A further object includes the provision of a microphone directed toward the user's head within a motor vehicle, and affixed to structure within the vehicle, the first loudspeaker carried by the member which is in turn carried by the user's head.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following specification and drawings, in which:

DRAWING DESCRIPTION

FIG. 1 is a perspective view of eyeglasses with prepared ear stems having holes pre-drilled, detachable speaker and support assemblies with pins also being shown.

DETAILED DESCRIPTION

The general objective of the present invention is to give the individual quality sound from a personal audio source, without speakers touching the ears, and/or without interfering and blocking surrounding sounds from the environment. The position of the audio elements is fixed so that the volume of the sound is constant, independent of movements of the listener.

The general arrangement is shown in FIG. 1. Detachable speaker assemblies 30 can be firmly attached to either eyeglass or sunglass ear stems 33. Each ear stem 33 is prepared to carry a speaker assembly 30 by means of holes 34 drilled into the ear stem at a specific location for optimal positioning of speaker assembly support elbows 32. Each support (member) elbow 32 connects a speaker assembly 30 to an ear stem 33 as by two pins 35 on the elbow that fit into ear stem

holes 34 in ear stem 33, and spaced lengthwise thereon. Flexible lead 31 connects speaker assembly 30 to personal stereo unit, car phone, or other audio sources. Other manner of detachable connection of 32 to 33, such as VELCRO, slide locks, and male-female snaps are also possible for this embodiment of the invention. (Elements 34 and 35 may be considered to represent same.) The eyeglasses also include panes 37 and ear hooks 38. Elbows may be generally S-shaped, as shown, to attach lengthwise to both 30 and 33.

The speakers are preferably located outward from the head and forward of the ears since listeners are generally used to listening to entertainment audio sources in front of the ear, yielding a natural orientation to the sound source.

The optimum distance is found by considering the following constraints:

1. Ease of fitting and low inventory, or one-size-fits- all without requiring a multitude of adjustments. (Multiple adjustments in position and angle of the speaker are mandatory if the speaker is to be at or very near the ear, as in prior devices, such devices being prone to slip and get out of adjustment especially while the user is active, such as while biking.) In the present invention, the speaker is far enough from the ear that small variations in the position of the ear opening are minimal with respect to the maximum fidelity zone of the speaker. If one considers anatomical variations of the ear position, but limits ear sampling to the set of persons on whom a given set of eyeglasses "fit" well enough to be comfortable, the variation is about 0.5 inch diameter, to include the vast majority of people. The maximum fidelity zone of a speaker is a cone in front of the speaker which is about 60 degrees in full angle. If one demands that all 98 percent of the ears in the above sample are in the maximum fidelity zone, then the distance from the speaker to the ear must be at least about 0.5 inch.

2. Enough volume to hear without distortion. The audio source 16 and the speakers 10 should produce enough volume so that the audio source can easily be heard over the background noises. Available speakers as in personal tape units or radios can be heard easily at 1 inch distance from the ear, at volume levels that present little distortion. The volume varies inversely with the square of the distance. At the distance of 3 inches, the volume requirement has increased almost by an order of magnitude. Most common units cannot broadcast quality sound that far without being hard to hear, the user being outdoors pursuing activities such as biking and running, or driving in traffic.

3. Speakers awkward and in the way. As the distance from the head increases, the speakers look unattractive and awkward and the probability of unwanted impacts greatly increases. At an extreme, if the speakers are far enough from the ears and diagonally forward of the ears, they are visible from the wearer's eyes and create visible blind spots. Speakers 3 inches away from the head are substantially more awkward than at a distance of 1 inch from the ear.

4. Cut off of environmental sounds. If the speakers are too close to the ear or in the ear, then environmental sounds can be overcome by output from the speakers. Of course, the volume interplays with the distance so that a specific inner cut-off is not at all sharp. However, it is found that at least 0.5 inch is needed to allow adequate hearing of environmental sounds.

5. Laws. The speaker system should be compatible with laws which prevent vehicle operators, including bikers, from wearing earphones. Again, at least 0.5 inch is a practical minimum in order for enforcement to be practical.

In recognition of the above factors, the preferred region from about 0.5 inch to about 1.5 inch from the ear opening from the ear is most practical and desirable.

I claim:

1. In combination with support means attachable to an upper portion of the user's head, the improvement comprising:

- a) a first loudspeaker carried by said support means in offset, proximate relation to the ear opening of one of the user's ears, the loudspeaker having an input to receive electrical signals from a signal source,
- b) the speaker having an audio output side, and said offset relation characterized in that said output side faces toward said ear opening when said support means is attached to the user's head,
- c) said support means including an ear stem of eyeglasses, said ear stem comprising a plurality of holes and said loudspeaker comprising a plurality of pins, wherein the pins are receivable in different holes to adjust the position of the loudspeaker relative to the ear stem.