

[54] **STETHOSCOPE HEADSET** 3,303,902 2/1967 Knott..... 181/24
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 New Hyde Park, N.Y. 3,671,685 6/1972 McCabe..... 179/156

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[57] **ABSTRACT**

[51] **Int. Cl.** **A61b 7/02**

Stethoscope-type headset for conducting sound from a remote location to a user's ears which is adjustable to fit widely varying individuals while being yet comfortable to all such individuals and secure during all normal head movement.

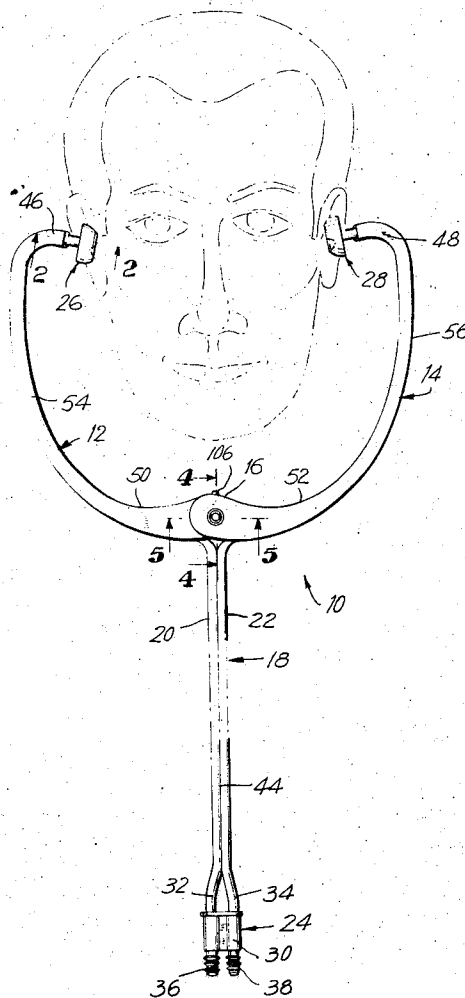
[58] **Field of Search**..... 181/24, 23, 31 R,
 181/31 B; 179/156, 1 ST, 182 A

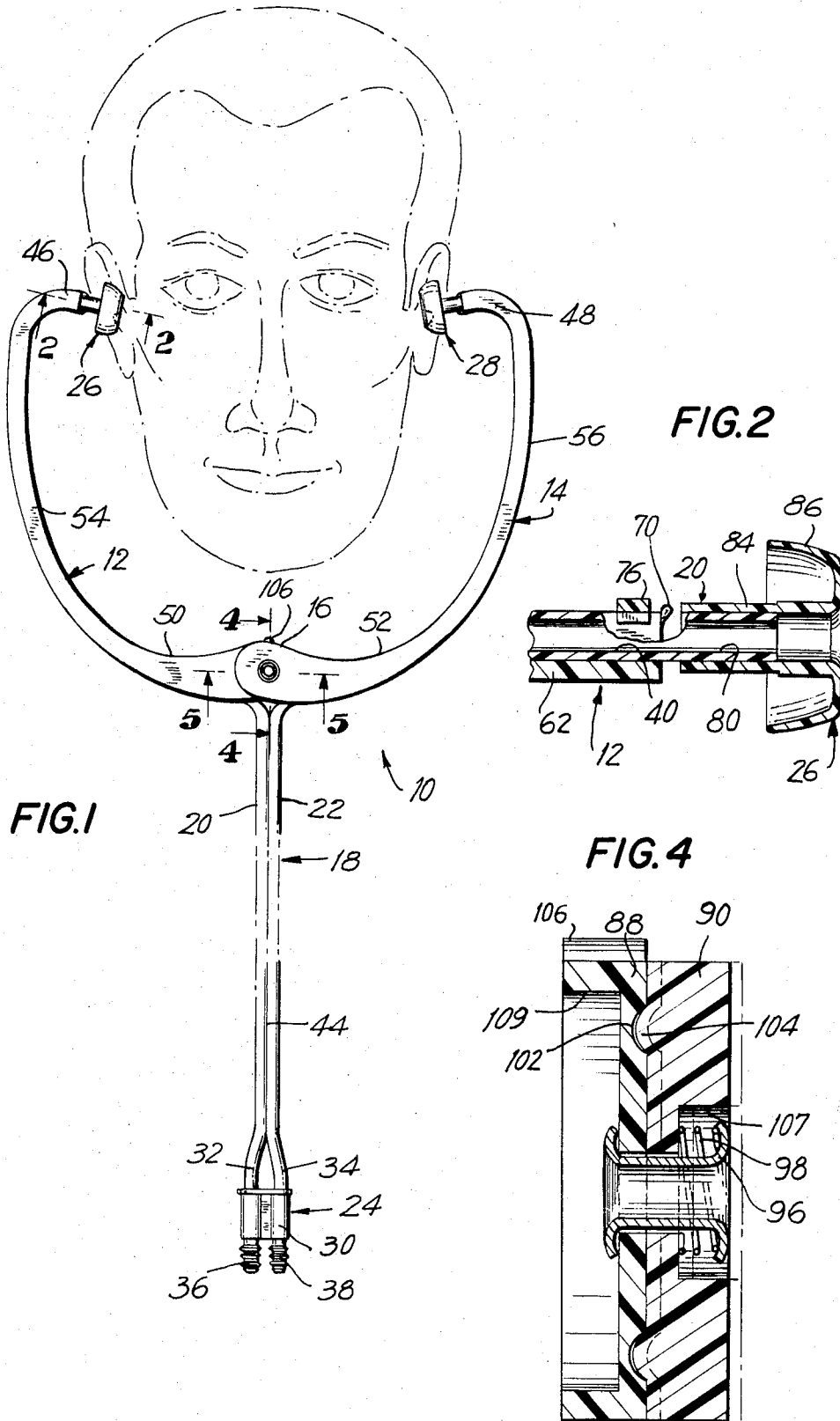
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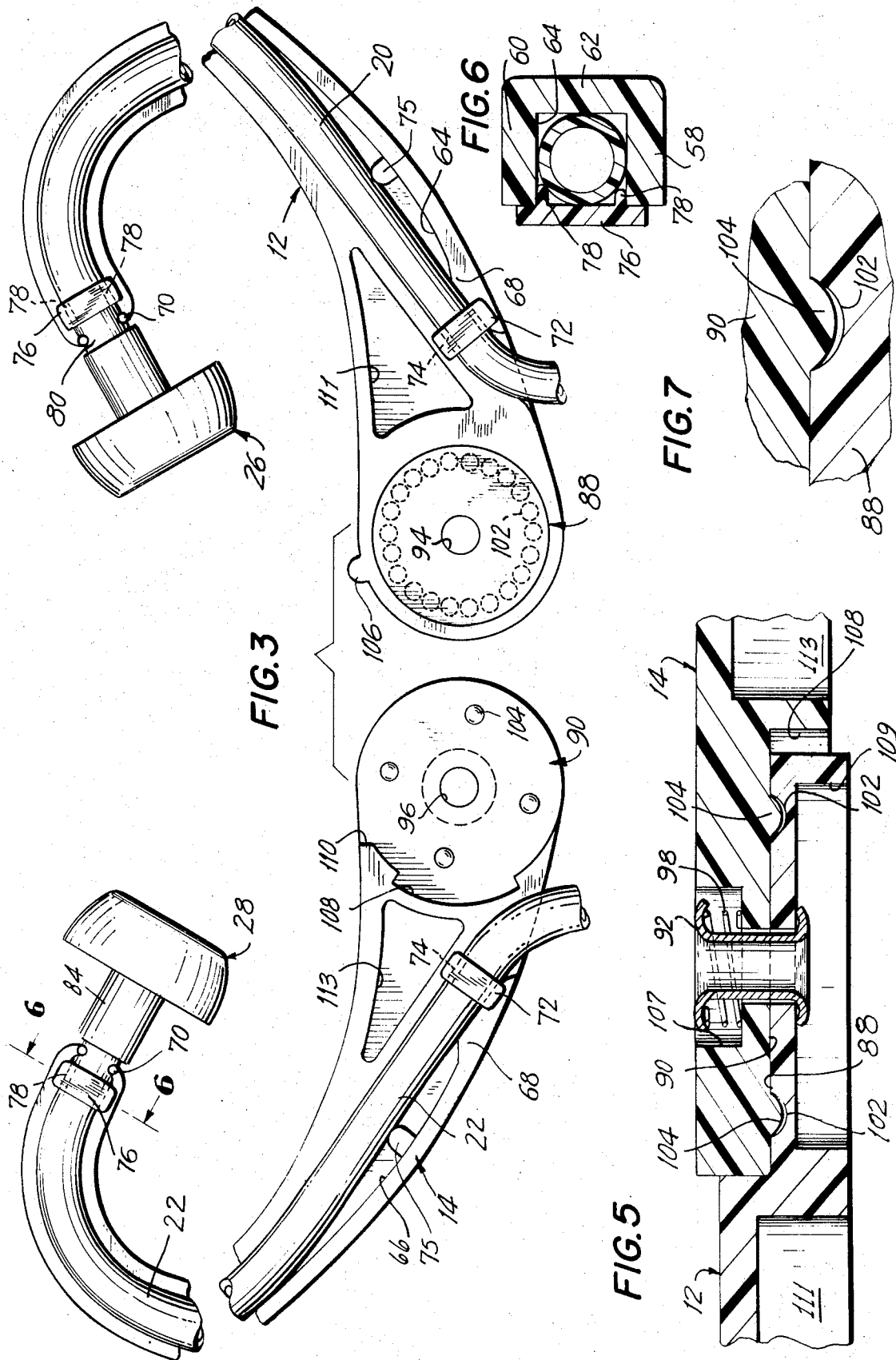
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4 Claims, 7 Drawing Figures







STETHOSCOPE HEADSET

This invention relates to stethoscope-type headsets and, more particularly, to an inexpensive yet comfortable and secure headset adjustable for use by a wide range of individuals.

Many commercial aircraft are today provided with sound systems for furnishing entertainment such as sound associated with a motion picture or stereo music, while the aircraft is in flight. Such systems may be provided with a plurality of channels for providing different modes of entertainment to different passengers while yet being non-disturbing to other passengers. In such systems the sound is piped from a fixed transducer through tubings to passengers' ears to enable, firstly, a substantial blockage of extraneous noise and, secondly, eliminating disturbance of other passengers. Moreover, accurate reproduction of the sound is desirable as well as the ability of the headset to conform to substantially any person who might be a passenger while being yet light and comfortable to the wearer and to remain in position even during normal head movements of the passenger. Yet further, inasmuch as the ear pieces of the headsets must be inserted in the passengers' ears hygienic considerations require that the headset, and particularly the ear pieces thereof, be either sterilizable or disposable and, even where disposability is not required it is desirable that the entire headset be relatively inexpensive so as to reduce losses due to pilferage, misuse, breakage, and the like.

Bearing in mind the foregoing, it is a primary object of the present invention to provide novel and improved headsets of the class described.

Another primary object of the present invention, in addition to the foregoing object, is the provision of such novel and improved headsets which may be utilized by substantially any passenger comfortably.

Still another primary object of the present invention, in addition to each of the foregoing objects, is the provision of such headsets which may be readily sterilized.

Yet another primary object of the present invention, in addition to each of the foregoing objects, is the provision of such headsets which are inexpensive to manufacture.

Yet still another primary object of the present invention, in addition to each of the foregoing objects, is the provision of such headsets having readily replaceable ear tips.

Another and yet further primary object of the present invention, in addition to each of the foregoing objects, is the provision of such novel and improved headsets which are light in weight, inexpensive to manufacture and durable and longlasting in use.

Yet another and still further primary object of the present invention, in addition to each of the foregoing objects, is the provision of such headsets which will remain in position throughout all normal head movements.

A yet further primary object of the present invention, in addition to each of the foregoing objects, is the provision of such headsets which are readily adjustable to various distances between a wearer's ears but which when once adjusted resist creep and movement towards non-adjustment.

It is a still further primary object of the present invention, in addition to each of the foregoing objects, to provide such headsets wherein at least a portion

thereof is sufficiently resilient so as to accommodate minor variations in sizes of prospective users' heads.

It is a yet another primary object of the present invention, in addition to each of the foregoing objects, to provide such novel and improved headsets wherein adjustment to various persons is accomplished simply, quickly, efficiently, and without requiring the usage of any tools.

It is a yet still further primary object of the present invention, in addition to each of the foregoing objects, to provide novel and improved headsets of the class described which exert minimal pressures on a user's ears while yet still effectively transmitting sound thereto and blocking extraneous noises.

It is another and yet still further primary object of the present invention, in addition to each of the foregoing objects, to provide novel and improved methods and apparatus of the class described.

The invention resides in the combination, construction, arrangement and disposition of the various component parts and elements incorporated in improved headsets and in methods of making, using and adjusting such headsets in accordance with the principles of this invention. The present invention will be better understood and objects and important features other than those specifically enumerated above will become apparent when consideration is given to the following details and description, which when taken in conjunction with the annexed drawing describes, discloses, illustrates and shows a preferred embodiment or modification of the present invention and what is presently considered and believed to be the best mode of practicing the principles thereof. Other embodiments or modifications may be suggested to those having the benefit of the teachings herein, and such other embodiments or modifications are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

IN THE DRAWINGS

FIG. 1 is a pictorial illustration illustrating the headset of the present invention in a position of use;

FIG. 2 is an enlarged partial cross-sectional illustration taken along line 2—2 of FIG. 1;

FIG. 3 is an enlarged partially exploded view of the headset of the present invention;

FIG. 4 is an enlarged partial cross-sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is an enlarged partial cross-sectional view taken along line 5—5 of FIG. 4;

FIG. 6 is an enlarged cross-sectional illustration taken along line 6—6 of FIG. 3; and

FIG. 7 is an enlarged cross-sectional view of one of the detents shown in FIGS. 4 and 5.

With reference now to the drawing, there is shown and illustrated an improved headset constructed in accordance with the principles of the present invention and designated generally by the reference character 10 comprising, in general, a pair of substantially rigid arm members 12 and 14 pivotally connected together at the lowermost extreme portions thereof by means of a pivot joint 16 and carrying a flexible tubular sound tube assembly 18 having flexible sound conduits 20 and 22 extending from a common connector portion 24 and with the upper end portions thereof associated, respectively, with the arms 12 and 14 for conducting sound to the ears of a wearer and being provided, at the upper

end portions thereof and for connection with the wearer's ears, with a pair of ear tips 26 and 28, respectively.

The common connector portion 24, which may be hereinafter referred to as a plug comprises a body portion 30 into which are connected the lower end portions 32 and 34, respectively, of the sound conduits 20 and 22 so as to provide two separated passages to a pair of plug tips 36 and 38 connected therewith and adapted to be engaged with mating female connector portions sonically connected with a pair of transducers. For further details of the structure of the plug or connector portion 24, reference may be had to my co-pending application Ser. No. 188,796 filed Oct. 13, 1971, now abandoned, which discloses an angular, rather than a straight connector but wherein the details of construction are substantially similar. Moreover, while there is shown and illustrated a binaural headset wherein the ear tips 26 and 28 are connected, by means of the sound conduits 20 and 22 with separate plug tips 36 and 38 so as to provide a stereo effect and the channeling of a separate audio channel to each of a wearer's ears, the connector portion 24 may, if desired, as for the transmission of a monaural sound source, be provided with an interconnecting passage connecting the lower end portions 32 and 34 of the sound conduits 20 and 22 to a single sound source. The connector portion or plug 24 may be molded of a plastic material, such as acrylonitrile butadiene styrene (ABS) and may be connected with the lower end portions 32 and 34 of the sound conduits 20 and 22 in any convenient manner, as by adhesive bonding.

The plug 24 may, as is believed to be readily obvious, be fabricated of a generally rigid material so as to exhibit substantial dimensional stability although, without departing from the present invention, a flexible and/or resilient plug body may be utilized.

The sound conduits 20 and 22, however, are preferably of a soft and flexible material, such as a soft polyvinylchloride plastic but which yet has substantial surface smoothness so as to, in the tubular form required, transmit sound therethrough with minimal losses. The soft and flexible nature of the polyvinylchloride material utilized for the tubing or sound conduits 20 and 22 provides, however, for freedom of movement of the wearer's head and substantial lack of pull, restraint, or the like, and, therefore, a very high degree of freedom of movement and effort. The sound tube assembly 18 which, as heretofore pointed out, comprises a pair of sound conduits 20 and 22 which, at least in the portions thereof extending generally between the plug or connector portion 24 and the arms 12 and 14, a generally parallel relationship and, in fact, the sound conduits 20 and 22 which comprise the sound tube assembly 18 may comprise a double tubular assembly extruded as a single unit having two generally circular portions corresponding to the sound conduits 20 and 22 each of which is provided with a generally circular aperture extending longitudinally generally centrally therethrough, designated 40 and a generally central web 44 extending therebetween so as to retain the portions of the sound conduits 20 and 22 between the arms 12 and 14 and the plug 24 as a generally unitarily flexible assembly.

The arms 12 and 14 may be of generally C-shaped configuration, as clearly shown in FIG. 1 and may be generally of generally U-shaped cross-sectional configuration as shown in FIG. 6. Hence, each of the arms 12 and 13 may have an upper portion 46 and 48, respec-

tively, adapted to be positioned in juxtaposition to a wearer's ears, a generally lower portion, 50 and 52, respectively, extending generally outwardly from the pivot joint 16, and intermediate portions 54 and 56, respectively, extending therebetween. The upper end portions 46 and 48, as well as the intermediate portions 54 and 56 may, as heretofore pointed out, be of generally U-shaped configuration having a pair of legs (FIG. 6) 58 and 60, respectively, extending generally parallel from a forward wall 62 with the forward wall 62, in the position of use, as illustrated in FIG. 1, extended generally parallel one another. Hence, each of the arms 12 and 14 may be described as having a generally open channel 64 and 66 extending generally inwardly of the rearward surface thereof. The sound conduits 20 and 22, respectively, may be laid within the channels 64 and 66 so as to extend generally axially and longitudinally along the arms 12 and 14 and the sound conduits 20 and 22 may be retained therewithin by means of projections 68 and 75 extending into the channels and detents 70 adjacent the limbs at the outboard end portions. Further, tabs 72 may be provided extending across the channels 64 and 66 and positioned by means of ridges 74, generally adjacent the pivot joint 16 and tabs 76 positioned by ridges 78, extending across the channels 64 and 66 at the upper end portions thereof generally adjacent the ear tips 26 and 28 with the tabs 72 and 76 being secured with the arms 12 and 14 in any convenient manner, as by means of cement, welding, adhesive, or ultrasonic bonding, it being preferable that the tabs 72 and 76 also be fabricated of a material compatible with the material of the arms 12 and 14 and, for example, the tabs and the arms may all be formed of ABS material. If the tabs 72 and 76 are omitted, the sound tubes 20 and 22 may be readily removed and replaced for cleaning, or the like.

Hence, the upper end portions 54 and 56 of the sound conduits 12 and 14 lie within the grooves and move with the arms 54 and 56, respectively.

The extreme upper end portions 80 and 82, respectively, of the sound conduits 20 and 22 extend generally beyond the end of the respective arms 12 and 14 and are inserted into the respective ear tips 26 and 28 so as to readily and simply retain the ear tips 26 and 28 in their assembled position.

The ear tips 26 and 28 are identical and, accordingly, hereinafter only one of the ear tips, namely, the ear tip 26 and its association with the end portion 80 of the sound tube 20 and its relationship to the arm 12 will be described in detail, it being understood and expressly pointed out that the other ear tip 28 and its association with the respective sound conduit 22 and arm 14 are identical.

Having particular reference to FIGS. 2 and 3, the ear tip 26 is of generally mushroom-shaped configuration having a generally tubular stem 84 and an outwardly curving head portion 86. The ear tip 26 is molded from a soft and highly compliant material, such as soft rubber. Moreover, the head portion 86 of the ear piece 26 is of sufficient depth that, combined with the soft nature of the material from which it is formed, as to form a good seal against a wearer's ears, while yet not providing any large pressures thereagainst over a substantial range of adjustments. In other words, as the ear tip 26 is pressed towards a wearer's head and towards further engagement into the wearer's ears, the head portion 86 rolls generally backwardly and outwardly so as

to present substantially the same face configuration and an annular seal of substantially the same diameter throughout the range of rolling motion thereof. It is this feature, combined with the joint structure to be described in substantial detail hereinafter, which contributes greatly to the comfort of the instant headset to a great variety of individuals while yet enabling positive angular relationships to be adjusted between the arms thereof. In other words, as will be described in more detail hereinafter, the joint structure 16 is particularly constructed and arranged so as to provide a large number of positively latched angular orientations between the arms 12 and 14 and, since the ear tips 26 and 28 are as hereinbefore pointed out constructed and arranged to provide substantially the same sealing configuration even during a wide range of relative positions, the novel headset 10 provides for the accommodation of substantially any wearer with substantially equal comfort and facility.

Referring now more particularly to FIGS. 3 through 7, the pivot joint 16 of the headset 10 in accordance with the present invention may comprise a pair of generally disc-like mating portions 88 and 90 integrally formed with the arms 12 and 14, respectively; a pivot pin 92 which may, as shown, comprise a generally hollow rivet extending through apertures 94 and 96 provided in the circular portions 88 and 90 so as to provide a pivot or axle about which relative rotation of the disc-like portions 88 and 90 and, therewith, the arms 12 and 14 may rotate, as well as means, such as a compression coil spring 98 disposed circumferentially around the rivet 92 for biasing the disc-like portions 88 and 90 towards each other. Yet still further, to provide for the positive angular latching of the disc-like members 88 and 90 necessary as aforesaid for providing positive adjustment of the arms 12 and 14, the disc-like portions 88 and 90 may be provided with mating indentations 102 and dimples 104, respectively. Yet still further, the pivot joint 16 comprises a limit stop arrangement consisting of an extension 106 extending generally radially outwardly from the disc-like portion 88 and engaged with a shoulder 110 or stop on the portion 90 limiting inward movement of the tips 26 and 28. A generally arcuate groove 108 may also be provided in the portion 90, as shown.

With particular reference to FIGS. 3, 4 and 5, it being remembered that FIG. 3 is taken from the reverse side of the headset from the view of FIG. 1, the generally disk-shaped portion 88 comprises a recess formed in the arm 12 having a surface generally parallel to and spaced apart from the surface of the web 62. Similarly, the generally circular disk-shaped 90 of the arm 14 is recessed from the rearward surface of the arm 14 and generally parallel thereto so that the disk-shaped portion 88 and 90 generally overlap in a generally dove-tail type arrangement as shown particularly in FIG. 5. Moreover, the disk-shaped portion 90 of the arm 14 is provided with a counterbore 107 within which the rivet 92 and compression spring 98 is disposed and the generally circular portion 88 of the arm 12 is similarly provided with a counterbore 109 within which the other end portion of the rivet 92 is disposed. The arms 12 and 14, in addition to the channels 64, may be further provided with generally triangular relieved portions 111 and 113, respectively, generally adjacent the generally disk-shaped portions 88 and 90, respectively.

The indentations 102 and dimples 104 are particularly constructed and arranged so as to provide particularly under the influence of the compression spring 98, a secure and positive latching of the arms 12 and 14 angularly one relative the other in any of a plurality of orientations, the angular separation between a possible orientation being selected such that the distance separating the tips 26 and 28 in adjacent latched configurations of the arms 12 and 14 is less than the distance over which the ear tips 26 and 28 are capable of compensating or, in other words, the distance through which the ear tips 26 and 28 are capable of providing a comfortable sealing against a wearer's ears without substantial pressure changes.

Accordingly, the indentations 102 and the dimples 104, as shown, are of substantial height, relative the thickness of the generally circular portions 88 and 90 so as to provide a substantial detent action under the impetus of the compression spring 98. Moreover, as particularly detailed in FIG. 7, the indentation 102 may be of greater depth than the height of the corresponding dimple 104 with the height difference being as much as 20 or 25 percent so as to provide generally annular contact therebetween assuring a substantially rigid latching positioning without play therebetween. Further, as shown, so as to further assure relatively positive latching the dimples 104 may number four in number, spaced apart approximately 90°, as shown in FIG. 3, while the indentations may number approximately 20 equally spaced at approximately 18° apart so that the angular positions of the arms 12 and 14 may be latched at approximately 18° apart. As heretofore pointed out, the deep nature of the indentations 102, the high nature of the dimples 104, and the differences in height thereof, as well as the generally circular nature of the dimples and indentations assures, under the impetus of the compression spring 98 a secure latching of the arms 12 and 14 in any of the orientations thereof. In combination with the deep relief of the mushroom-shaped ear pieces 26 and 28 and their ability to roll so as to provide positive sealing without substantial pressure changes throughout an extent sufficient to compensate for the intermediate positions between the latched configurations of the arms 12 and 14 results in the headset 10 being capable of secure, acoustically efficient but yet comfortable use by widely diverse wearers, particularly in view of the extreme light weight thereof.

While the invention has been described, disclosed, illustrated and shown in terms of an embodiment or modification which it has assumed in practice, the scope of the invention should not be deemed to be limited by the precise embodiment or modification herein described, disclosed, illustrated or shown, such other embodiments or modifications as may be suggested to those having the benefit of the teachings herein being intended to be reserved especially as they fall within the scope and breadth of the claims here appended.

What is claimed is:

1. Stethoscope headset comprising a pair of curved generally C-shaped arms having upper and lower end portions and joined together through pivot means at the respective lower end portions, each of said curved arms being channel shaped in cross-section, sound carrier conduit means located in said channels and extending generally outwardly of each of the upper end portions of the curved arms to face each other in opposed

relation, removable means cooperating with said channel and said conduit means to hold said conduit means in said channel at the upper and lower end portions, carpiece means comprising soft, compliant material and each formed with an inwardly directed tubular portion telescopically connected to the conduit means at the upper, outwardly extending portions thereof, said carpiece means being of sufficient depth to permit same to roll backwardly and outwardly to conform to various shapes of users' heads, said pivot means comprising a pair of generally disc-shaped mating portions formed at the lower ends of the respective curved arms, detenting means for the disc-like portions comprising indentations and dimples formed on said portions to hold said portions in different positions of angular adjustment.

2. The structure of claim 1 wherein each disc-like

portion has a counterbore formed therein, said pivot means comprising a pivot pin disposed in said counterbore permitting pivotal movement of said arms with respect to each other, means biasing said disc-shaped mating portions together, said biasing means being received wholly in the counterbore of one of said mating disc-like portions.

3. The structure of claim 1 wherein said indentations and dimples are spaced generally equally at an even number of angular locations.

4. The structure of claim 3 wherein said dimples number four in number spaced at approximate right angles to one another and said indentations number approximately 20 in number equally spaced along the circle to cooperate with said dimples in various positions of adjustment.

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