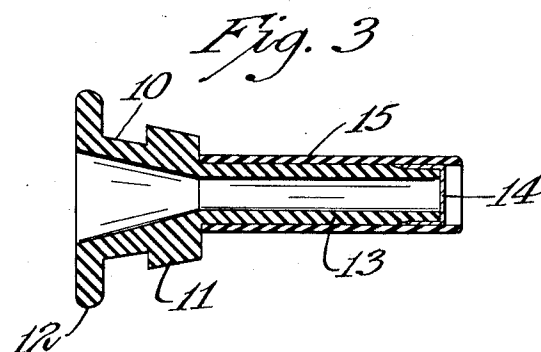
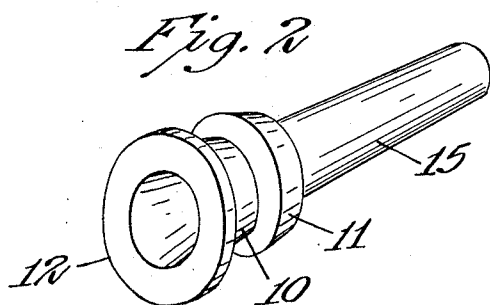
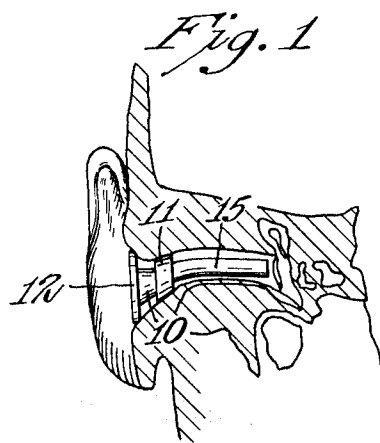


June 9, 1953

J. R. BEAUDRY
MECHANICAL HEARING AID

2,641,328

Filed July 26, 1948



Inventor
John R. Beaudry
By Williamson & Williamson
Attorneys

UNITED STATES PATENT OFFICE

2,641,328

MECHANICAL HEARING AID

John R. Beaudry, Minneapolis, Minn.

Application July 26, 1948, Serial No. 40,738

1 Claim. (Cl. 181—23)

1

This invention relates to a device for improving defective hearing, and more particularly to a self-contained hearing aid.

Experiments performed with persons having impaired hearing or a total lack of natural hearing have shown that my invention is in some cases capable of restoring hearing to varying degrees and in other cases to apparently full restoration.

The results of experiments to date have indicated that my invention produces results in cases of destruction of or damage to the drum, but the extent of its field of effectiveness has not yet been fully determined.

Some of the cases where hearing has been improved or restored include those involving lack of eardrums at birth, perforated and collapsed eardrums and some which have been rendered partially or totally ineffective through illness or advanced age.

The device has been proven effective where electronic hearing aids have failed, and it has restored the hearing of others who have used electronic hearing aids with gradually diminishing effectiveness.

It is a general object of the invention to provide a hearing aid which apparently serves as a substitute for the natural drum and which is so constructed that it will conveniently and comfortably fit in the ear canal in such a way as to be extremely inconspicuous.

Another object of the invention is to provide a hearing aid unit in which the entire functional structure is located within the ear, thereby eliminating the need for external microphones, sources of power and the like.

Still another object of the invention is to provide a hearing aid which can be inserted and used without the use of instruments or technical medical supervision and without any danger to the user.

The above and other objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawing, wherein like reference characters refer to the same parts throughout the views, and, in which:

Figure 1 is a partial sectional view through an ear canal showing the device in an operative position;

Figure 2 is a perspective view of the device per se; and

Figure 3 is a view partially in side elevation and partially in longitudinal section.

The embodiment of the invention shown in the

2

drawing includes a thin walled cup-shaped ear piece 10 which has a yielding flange 11 therearound and spaced inwardly a short distance.

These two elements are preferably formed of a soft plastic material having sufficient strength to maintain its general shape when inserted in the entrance of an ear canal. The cup 10 has a small flat outer flange 12 extending radially from its outer edge. This outer flange serves as a means for preventing the cup from being pushed too far into the entrance of the ear canal, and it also constitutes a small handle which facilitates gripping the cup so that it can be readily removed when desired.

The bottom of the cup is apertured and has the outer end of an ear canal tube 13 molded thereto. This tube is preferably made of a rather readily yieldable plastic such as polyethylene which also can be used to form the cup. This tube should be sufficiently yielding so that it will readily assume the shape of the ear canal since the canals of different individuals may vary considerably. Some are relatively straight while others are more or less tortuous.

The inner end of the tube 13 has a diaphragm 14 stretched taut across it. This diaphragm should be of a material as nearly approaching the qualities of a human eardrum as possible. Some types of fish skin, and thin animal membranes have been found effective and there are some synthetics such as the one sold under the trade-mark "Silverlite" by Julius Schmidt Company of New York city. This is a capping skin and is used for certain types of gauges and some types of musical instruments.

In the embodiment of the invention shown in the drawing the diaphragm material is placed over the inner end of the tube 13 and a section of the tube 15 which closely fits the outside of the tube 13 is placed over the diaphragm and the tube 13 to hold said diaphragm in position. The two tubular elements 13 and 15 can be dipped in a plastic solvent which firmly unites them so that the diaphragm is securely held in place.

It should be noted that the diaphragm 14 is spaced a short distance from the end of the tubular member 15. This is to assist in protecting the diaphragm from wax deposits and also prevents it from contacting any of the ear structure so that it can vibrate freely.

It has been found that when the cup 10, with its thin walled structure, is fitted closely to the ear canal entrance, a maximum amount of sound waves are intercepted and directed inwardly against the diaphragm 14. Where there is a

3

loose fit at the canal entrance, there is a loss of efficiency.

The devices can be made up in several standard sizes so that they will comfortably fit various sizes of ear canals. If they are confined to a certain maximum length, they can be inserted in nearly any size ear. However, in some cases it may be desirable with the assistance of an ear doctor to have them fitted for length depending upon the distance from the entrance of the ear canal to what would be the natural position of the drum for that individual. In some cases it has been found that the closer the hearing aid or diaphragm is located to the natural drum position the more effective the device will function.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What I claim is:

A mechanical hearing aid device comprising a tubular sound transmitting member constructed of somewhat resilient and yieldable plastic and of an external diameter throughout the inner portion thereof for fitting into a human ear canal, the outer end of said integral member flaring for reception of sound and having a terminal collar of greater diameter than the entrance of a human ear canal to act as an abutment to limit inward positioning of the device, and said outer portion of said member having a yielding annular flange secured inwardly in

4

spaced relation to the outer end of said member and of a diameter to engage with and seal with said ear canal leaving at least the greater portion of the inner end of said tubular member spaced with relation to said canal, a sound-responsive vibrator element constructed of extremely thin animal tissue extending completely across the inner end of said tubular member and having a cylindrically flanged portion surrounding the inner end of said tubular member, and a combined diaphragm-retaining and guard member in the form of a somewhat flexible and resilient tube closely surrounding the inner end of said first mentioned member and stretching said diaphragm tightly over the inner end of said first mentioned member, said last mentioned tube extending for some distance inwardly and beyond said diaphragm to protect said diaphragm against wax deposits from the human ear.

JOHN R. BEAUDRY.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
439,099	Blodgett -----	Oct. 28, 1890
886,790	Frank -----	May 5, 1908
1,258,162	Stewart -----	Mar. 5, 1918
2,191,832	Pohlman -----	Feb. 27, 1940

FOREIGN PATENTS

Number	Country	Date
1,169	Great Britain -----	Jan. 17, 1908
363,294	Italy -----	Oct. 1, 1938