

[54] SELF-FITTING HEARING PROTECTOR
[75] Inventor: Frederick M. Lewis, Burnt Hills,
N.Y.
[73] Assignee: Marion Health and Safety, Inc.,
Rockford, Ill.
[22] Filed: Aug. 6, 1973
[21] Appl. No.: 386,146

[52] U.S. Cl. 181/135; 128/152
[51] Int. Cl. A61f 11/02
[58] Field of Search..... 128/151, 152; 181/33 R,
181/23, 135

[56] References Cited
UNITED STATES PATENTS
2,670,737 3/1954 Cantor 128/152
2,672,863 3/1954 Leight..... 128/152

2,803,247 8/1957 Lwislocki..... 128/152
2,850,012 9/1958 Becker..... 128/152
3,736,929 6/1973 Mills..... 128/152
3,771,521 11/1973 Kittredge 128/152

Primary Examiner—Stephen J. Tomskey
Attorney, Agent, or Firm—Wolfe, Hubbard, Leydig,
Voit & Osann, Ltd.

[57] ABSTRACT
A self-fitting earplug has a generally elongated, ovoid-
or bullet-shaped mass of deformable putty-like poly-
mer enclosed in an elastomeric or resilient envelope
which urges the polymeric mass toward its original
shape when deformed or elongated and inserted in the
ear canal whereby the earplug conforms to the ear
canal walls providing a close fit in the canal for atten-
uation of sound and sealing of the ear opening.

1 Claim, 2 Drawing Figures

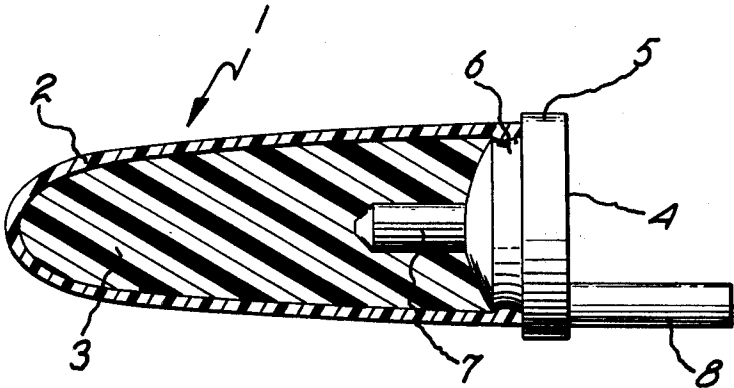


Fig.1

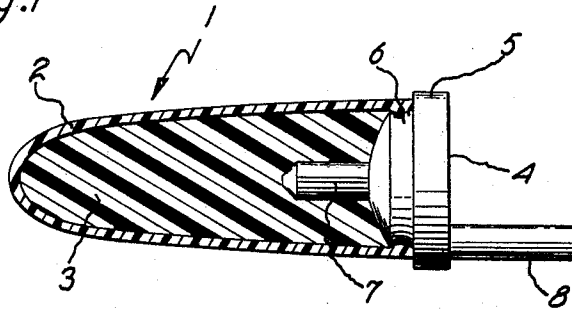
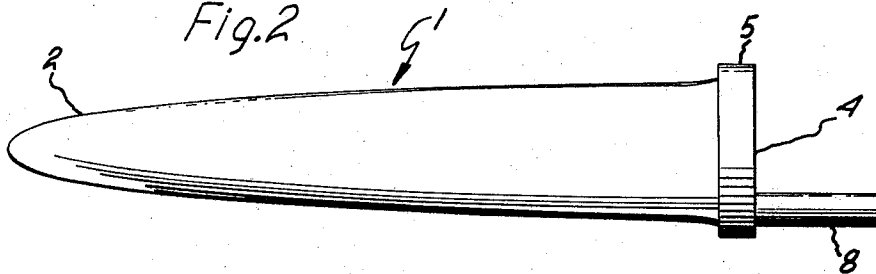


Fig. 2



SELF-FITTING HEARING PROTECTOR

This invention relates to self-fitting earplugs or protectors. More particularly, it relates to earplugs for hearing and other ear protective purposes which are readily deformable for insertion into the ear canal and which, after insertion, are self-adjusting closely to conform to the contour or wall of the ear canal providing a comfortably tight fit. The plug is normally provided with a handle and can be readily removed with a gentle pull which deforms the earplug for easy withdrawal.

Earplugs or protectors are well known and have taken a variety of shapes and configurations. For example, there is shown in U.S. Pat. No. 2,246,737 an ear stopper of resilient material having projecting annular fins which deform to contact the ear canal wall upon insertion. Shown in U.S. Pat. No. 2,446,707 is an earplug having a resilient skin containing a spongy, resilient filler consisting of finely ground sponge rubber.

U.S. Pat. No. 2,670,737 describes an ear protector having a hollow, flexible envelope containing finely divided graphite. U.S. Pat. No. 3,131,241 shows an undulating latex skin containing air under slightly superatmospheric pressure which is displaced within the envelope. U.S. Pat. No. 2,888,921 shows a shaped air-containing balloon-like member which can be compressed upon insertion to supposedly conform to the ear canal contour.

While the prior art such as that described above provide protection for the ear of varying degrees against sound and other outside influences, there is lacking in such prior art an earplug or protector which can be easily deformed by the user before insertion into the ear, thus avoiding the physical forcing of the earplug structure into the ear canal with possible subsequent damage to and irritation of the sensitive lining or wall of the canal. At the same time, removal of such prior art devices in many cases once again causes scraping and subsequent irritation of the sensitive skin or membrane in the ear canal. In the case of air-filled earplugs, there is always the possibility of puncturing the enclosing skin with subsequent loss of protective capacity. The same is true of earplugs which are filled with a finely divided material which, upon accidental rupture of the skin, might contaminate and cause infection in the ear.

It is a principal object of the present invention to obviate the shortcomings of prior art ear protectors.

It is a further object of the present invention to provide an earplug which can be deformed by the user before insertion in the ear and which, after insertion, readily adjusts itself in a self-fitting manner to provide a comfortably tight fit between the plug periphery and the contours of the ear canal.

Another object of the present invention is to provide an ear protector which can be readily removed from the ear canal without scraping or irritating the ear canal wall.

Those features of the invention which are believed to be novel are set forth with particularity in the claims appended hereto. The invention will, however, be better understood and further advantages and objects thereof appreciated from a consideration of the following description and the drawing in which

FIG. 1 shows a cross section of a typical embodiment of the ear protector in its normal unextended condition, and

FIG. 2 is a view of the earplug in its stretched or ex-

tended condition for ready insertion into the ear canal.

Briefly, according to the present invention there is provided an earplug having an elongated, ovoid- or bullet-shaped skin or envelope of an elastomeric or resilient material which is filled with a putty-like polymer or plastic, the earplug being capable of being elongated or reduced in cross section for ready insertion into the ear, the elastomeric skin after positioning of the plug within the ear canal tending to urge the putty-like polymer filler to return to its original ovoid shape, thus conforming to the contour of the ear canal, the contact of the skin with the ear canal wall blocking out foreign material and serving along with the putty-like polymeric mass to attenuate or deaden sound waves impinging upon the ear. A handle can be attached as desired for ready insertion and withdrawal of the ear protector.

Any of a number of materials can be used in making the present earplugs. For example, the skin or envelope containing the putty-like polymeric mass can be made of natural rubber or latex or any of a number of synthetic elastomers including but not limited to elastomers of polyisoprene, silicone, polybutadiene, ethylene propylene copolymer, butyl rubber, polysulfide, acrylates, and the like, the primary consideration being that it should not as used irritate the skin or lining of the ear canal. Likewise, any of a number of putty-like polymeric materials can be used as the filler including so-called silicone bouncing putties and other materials having similar characteristics. These materials should preferably also be non-irritating to the skin.

The inserting and withdrawing handle can also be made of any of a number of plastic materials, it preferably being made of one which is resilient to prevent possible injury to the ear.

The elastomeric skin can be made in any of the usual manners. For example, it can be painted onto a form of suitable shape or by dipping a form or mold into a solution of the elastomeric material. It is also possible to use as the mold itself the putty-like polymer in its initial desired shape. If the skin is not formed around the filler polymer, the plastic is inserted later into the formed envelope and the handle inserted and fixed in place as shown in the drawing. Referring to the drawing, there is shown in FIG. 1 a typical embodiment 1 of the present invention, the skin 2 being of any elastomeric material which is non-irritating to the skin. In a typical earplug, this skin can be of a polyphenylene oxide-silicone copolymer such as that described in U.S. Pat. No. 3,696,137 and preferably such a material as described in U.S. Pat. No. 3,668,273.

Contained within the skin or envelope 2 is the putty-like polymer filler which can be of any of a number of materials apparent to those skilled in the art but which, in a preferred embodiment, is a so-called silicone bouncing putty such as that described in U.S. Pat. No. 2,541,851 and 3,213,048, among others.

The handle 4 can be made in any form desired, a typical configuration being that shown in FIG. 1 in which the handle has slightly protruding rim 5, a plug-like portion 6 to fit within the open end of the skin for adherence thereto, and, if desired, an internal extension 7 which in cooperation with the putty-like filler 3 provides for a more secure attachment of the handle. An external extension 8 provides a means for grasping the handle. The handle can be fixed to the skin with a suit-

able adhesive. In appropriate cases, heat sealing or other methods of fixing the handle can be used.

As pointed out above, FIG. 1 shows the general elongated, ovoid- or bullet-shaped nature of the earplug before insertion into the ear. While such a plug can be made of one median size which can fit most ears, it will be realized that its dimensions can be changed to provide for ear canal openings which deviate from the normal size. By comparing FIGS. 1 and 2, it will be seen that the envelope 2 of the plug is capable of being stretched to a length at least 75 percent greater than its original relaxed length and may return to its original relaxed length.

Before inserting the present earplug into the ear canal, it is stretched or elongated as by hand to a shape such as that illustrated in FIG. 2, the amount of elongation being adjusted to the individual ear canal to be fitted, care being taken that such elongation is not so extended as to contact the ear drum. Upon elongating the earplug to a cross section or diameter less than that of the ear canal, it is inserted into the ear canal generally to the point where the handle fits over the mouth or opening of the canal and released. Thereupon, under the urging of the elastomeric envelope 2, the putty-like polymeric filler 3 tends to resume its normal shape as shown, for example, in FIG. 1. In the process of attempting to return to its original shape, the skin 2 intimately contacts the variations in the configuration of the ear canal effectively sealing the canal against foreign materials and attenuating any sound impinging upon the ear. The present earplugs are particularly useful for sealing the ear during immersion in water.

When the need for ear protection is ended, the earplug can be removed by a gentle pull on the handle, the elastic skin under the urging of the pull deforming the puttylike polymer filler to the extent necessary for withdrawal. Upon withdrawal, the plug resumes its original shape shown generally in FIG. 1 and after cleaning as by washing or the usual sanitary care is ready for re-insertion.

While in normal use lubricants are not required in the use of the present invention, in some cases it may be desirable to coat the skin of the earplug with a lubricant such as petroleum jelly or the like to facilitate insertion and withdrawal.

There is provided by the present invention a self-fitting earplug or protector which is readily and comfortably inserted into the ear canal where it provides a comfortably self-adjusting fit with the ear canal wall and which, after the need for its use has passed, is readily withdrawn from the ear.

I claim:

1. An ear protector adapted to be inserted into the ear, said ear protector comprising a resiliently yieldable elongated tubular envelope of substantially circular cross-section, said envelope being shaped generally as a bullet and tapering gradually and unidirectionally from a large diameter base end to a smaller diameter and rounded tip end, the base end of said envelope being open and the tip end of said envelope being closed, said envelope being made of a silicone polymer elastomer and being capable of being stretched to a length at least seventy-five percent greater than its original relaxed length and then returning to its original relaxed length, a mass of deformable polymer material filling and sustaining said envelope and conforming substantially to the shape of said envelope, said mass being deformed when said envelope is stretched in length and reduced in diameter for insertion into the ear canal, and then tending to resume its initial shape under the urging of said resiliently yieldable envelope as the latter returns toward its original length and diameter and swells into substantial conformance with the contour of the ear canal, a plug telescoped into and bonded to the open base end of said envelope and serving to close said base end to retain said mass within said envelope, and a handle projecting outwardly from said plug to facilitate insertion of the envelope into and removal of the envelope from the ear canal.

* * * * *

45

50

55

60

65