# United States Patent [19]

**Grout**

[11] **3,896,801**

[45] **July 29, 1975**


[54] **EAR PLUG**


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[22] Filed: **May 29, 1973**

[21] Appl. No.: **364,378**

[52] **U.S. Cl.** ..... **128/152**

[51] **Int. Cl.** ..... **A61f 11/00**

[58] **Field of Search** ..... 128/152, 151; 181/23



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[57] **ABSTRACT**

A sound restricting ear plug consisting of a flat disk of a resilient material such as polyethylene. To one side of the disk is secured a thin walled hollow member, such walls being substantially thinner than the flat disk so that such walls have substantially no resilience. The walls of the hollow member are provided with deep folds or pleats to give it enough rigidity so that it may readily be inserted into the auditory canal of a human ear and hold the bottom side of the disk in contact with the external surface of the ear surrounding the entrance to the auditory canal. A knob is provided on the other side of the disk for being grasped by the fingers of the user.


**1 Claim, 3 Drawing Figures**

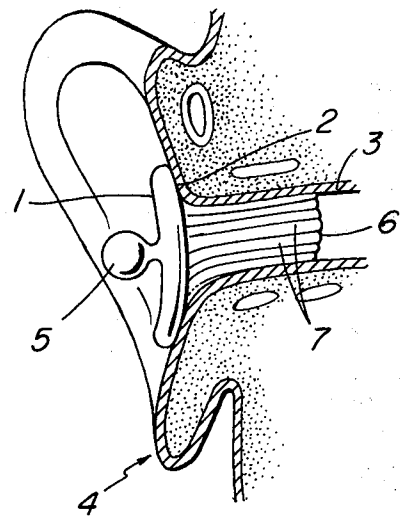
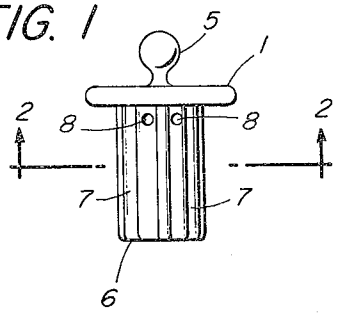


FIG. 1



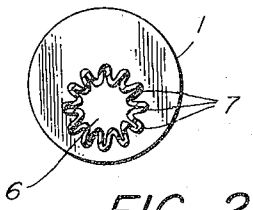




FIG. 2

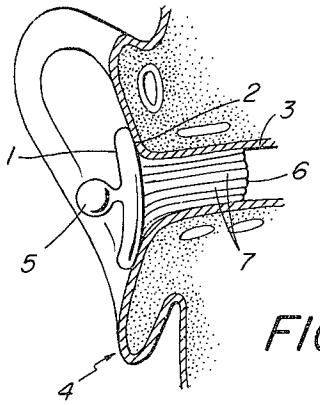



FIG. 3

# EAR PLUG

## SUMMARY OF THE INVENTION

The present invention is designed for the purpose of excluding all but moderate levels of disturbing sound from the ears of persons such as passengers on airplanes. For such purposes in the present invention it is merely necessary to cover the opening to the auditory canal with a flat moderately flexible plate which seats against the external surfaces of the ear surrounding the entrance to the auditory canal. These surfaces are relatively insensitive to the mechanical pressure exerted against them by such a plate which therefore may be worn for long periods with no discomforture. In order to maintain such a plate firmly in position, it has secured to its inner side a thin walled hollow tubular member closed at its outer end. This hollow tubular member is so thin that it is flexible enough to conform with all of the variations in shape and size of the outer portions of the auditory canal. However, it is given enough internal rigidity to enable it to be readily inserted into such canal by forming its walls with folds which, however, do not interfere with the ability of the tubular member to flex into whatever shape is dictated by the inner configuration of the auditory canal. As a result, the presence of such a tubular member in the auditory canal creates virtually no sensation of pressure or other sensations which might be of discomfort to the wearer.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the annexed drawings:

FIG. 1 is a side view of my novel ear plug;

FIG. 2 is a cross-section taken along line 2—2 of FIG. 1; and

FIG. 3 is a sectional view of a human ear with the ear plug of FIG. 1 inserted therein.

## DETAILED DESCRIPTION OF THE INVENTION

The ear plug comprises a disk 1 of a flexible material such as polyethylene molded into a flat plate being sufficiently flexible to seat against the external surfaces 2 surrounding the entrance to the auditory canal 3 of a human ear 4. The thickness of the disk 1 is sufficiently large so as to give it a substantial degree of resilience such that, when flexed against such surfaces its restorative force causes it to exert a moderate amount of sealing pressure between it and said surfaces. The disk 1 is also molded with an integral external knob 5 which may easily be grasped by the fingers.

In order to retain the disk 1 in place against the ear surfaces 2, there is secured to the side of the disk 1 opposite the knob 5 a thin walled hollow tubular member 6. The wall of member 6 may also be made of a flexible material such as polyethylene but this wall is substantially thinner than the thickness of the disk 1. The difference between such thickness is such that the wall of member 6 has virtually no resilience in itself. In order to give member 6 sufficient rigidity to enable it to be inserted into the auditory canal 3, it is folded into relatively deep folds or pleats 7. Member 6 preferably has its outer end closed and may be provided with one or more holes 8 to provide air vents in its wall. The member 6 may be molded separately from the disk 1 by a



suitable method such as vacuum forming, and then heat sealed to the inner side of disk 1. Since the entrance to the auditory canal 3 is not centrally located with respect to the external ear surfaces 2, the member 7 is preferably eccentrically sealed to the inner side of disk 1.

When the plug is inserted into an ear, as shown in FIG. 3, the flexibility of member 6 and the adaptability afforded by the folds 7 cause it to conform to all of the internal contours of auditory canal 3 with virtually no lateral pressure being exerted by member 6 against the walls of the auditory canal. The member 6 is retained within such canal virtually solely by the frictional forces existing between the folds 7 and the walls of the canal. The total length of the member 6 is substantially shorter than the distance between the entrance to the auditory canal and the ear drum located at the inner end of the canal so that there is no danger of the end of member 6 touching the ear drum.

When the plug has been inserted into the position shown in FIG. 3, the wearer experiences virtually no sense of the presence of member 6. He will be conscious of the slight pressure exerted between the inner surface of disk 1 and the external ear surfaces 2. However, since these surfaces are quite insensitive, the plug may be worn for long periods of time with a substantial absence of discomfort. However, the sound barrier created by the presence of the disk 1 closing the entrance to the auditory canal so diminishes the sound reaching the ear drum that all disturbing sounds are reduced to non-disturbing levels. The disk 1, while shown in substantially circular form, may be of any convenient shape, such as elliptical, to conform with the contours of the external ear surfaces 2.

What is claimed is:

1. An ear plug comprising:

a. a flat, imperforate, flexible plate adapted to provide an imperforate sound barrier, having a bottom surface adapted to contact the external surfaces surrounding the entrance to the auditory canal of the human ear, the flexibility of said plate to follow the contours of said surfaces when brought into contact therewith;

b. an elongated thin walled hollow flexible tubular member having one end secured to said bottom surface, the walls of said flexible member being substantially thinner than the thickness of said plate and having substantially no resiliency, the other end of said flexible member being closed;

c. said thin walled member being adapted to be inserted into said auditory canal to retain said bottom surface of said plate in contact with said external surfaces;

d. said bottom surface extending beyond the walls of said thin walled member around the entire periphery of said thin walled member, thus providing a portion of said bottom surface for contacting said external surfaces along the entire periphery of the entrance to said auditory canal;

e. the walls of said hollow member being provided with a plurality of folds extending longitudinally along the length of said hollow member from said one end to said other end.

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