Nov. 6, 1951 M. C. ROSENBLATT 2,574,288

EAR PROTECTOR

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Fig. 1

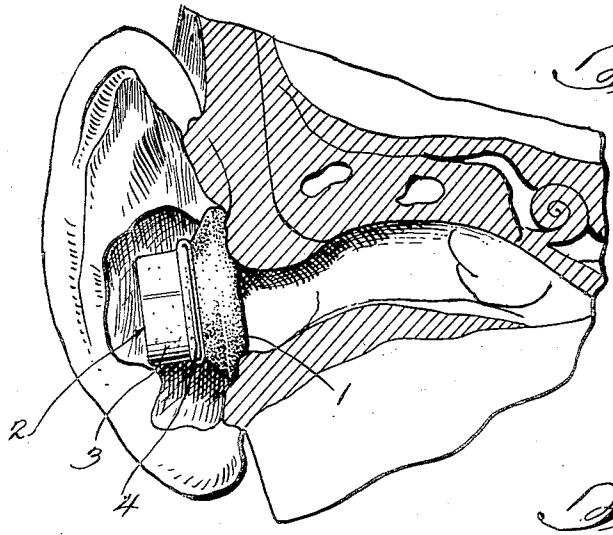


Fig. 5

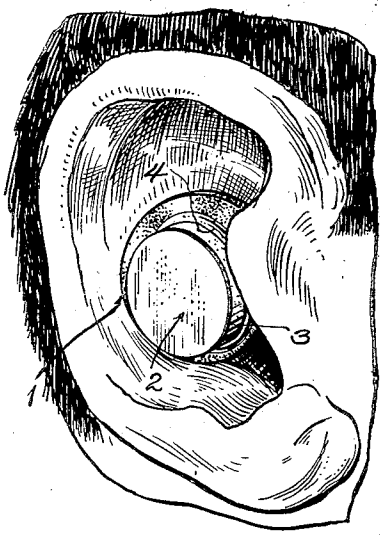


Fig. 2

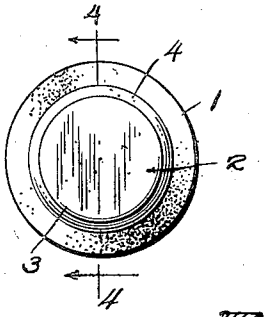
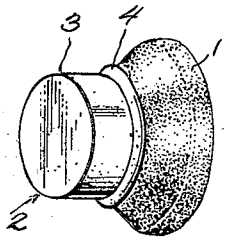


Fig. 3



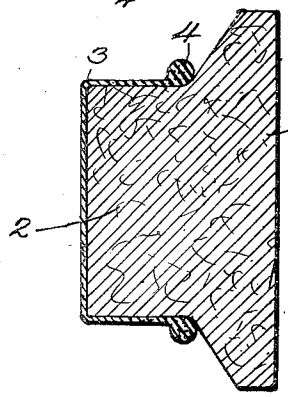


Fig. 4

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EAR PROTECTOR

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9 Claims. (Cl. 128—152)

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This invention relates to an ear protector or guard intended primarily for excluding the admittance of sound waves to the inner ear, but is also useful as a support for hearing-aid receivers, etc.

Under many conditions of modern warfare, and even in some of the present-day manufacturing plants, it becomes desirable and indeed essential to stop off the meatus of the ear canal so as to avoid injury, if not complete rupture, of the eardrum.

Various attempts have been made to provide acoustic guards for the ears, and some of them have been patented, but these earlier devices have been defective for various reasons. For instance, many of them are designed to enter the ear canal itself, which is an extremely dangerous proceeding. The ear canal is very tender beyond the entrance and the hair follicles endeavor to force out anything therein; if the foreign substance resists, then irritation of the canal is automatically induced. Prior devices have also been defective, particularly those including wax in their make-up, because they were unsanitary in that they tended to collect dirt, which was transmitted to the ear canal, and also because wax per se or even wax combined with an ordinary plasticizer is crystalline and tends to crumble very easily. Morever, prior devices have been defective in that, even at their best, they could provide an acoustic reduction of less than 35 decibels, thus allowing a sufficiently large fraction to enter the ear canal to impair the eardrum. Also, the wax of these earlier devices tended to stick to the operator's fingers while being installed in the ear, thus rendering the seal defective even before it was actually in place.

It is an object of the present invention, therefore, to provide an ear protector which is capable of providing an acoustical reduction of more than 50 decibels, which is the top limit of deafening except for the increment of sound waves entering the middle and inner ear by bone conduction.

It is a further object of the invention to provide an acoustical guard which is highly effective in excluding sound waves from the ear canal without itself being inserted in the canal, and which requires very little pressure to secure a seal and to provide the necessary adhesion to maintain it indefinitely in place.

A further object of the invention resides in the provision of an ear protector or acoustical guard formed of a wax of substantially non-crystalline structure, and one in which the liability of collecting dirt and dust is reduced to a minimum.

It is a still further object of the invention to provide an ear protector formed of wax to which is added a means for preventing the adherence

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of the protector to the fingers when it is being installed in the wearer's ear.

Other objects and advantages of the invention will be in part pointed out and in part apparent to those skilled in the art from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a cross-sectional view through the ear canal and related parts, and showing the ear protector of the present invention installed therein;

Figure 2 is a plan view of the ear protector;

Figure 3 is a perspective view thereof;

Figure 4 is an enlarged longitudinal sectional view taken on the line 4—4 of Figure 2; and

Figure 5 is a front elevational view of the human ear with the protector positioned therein.

The ear protector forming the subject matter of the present invention is formed mainly of a wax composition and is provided with a disc or head portion 1 and a cylindrical grip 2 integrally formed therewith. The finger grip portion is covered with a protective coating, preferably of rubber, and is designated by the numeral 3.

Ordinary commercial wax has a crystalline structure, but in more recent years waxes which have been termed micro-crystalline waxes have been developed which, while not in an amorphous state, do approach such formation, and, therefore, do not crumble as readily as ordinary waxes. In constructing the ear protector of this invention, micro-crystalline waxes, having a melting point of about 175° F., are used, in conjunction with a plasticizer, such as petroleum jelly, and are up-graded by the inclusion of elastomeric polyisobutylene "Vistanex." While various percentages of these materials may be employed, it is preferred to use about 10% to 15% of petroleum jelly and about 5% to 20% of polyisobutylene. This composition, either with or without a flock loading is molded into a shape providing the head 1 and the finger grip portion 2, the dimensions of which may vary but will usually run about $\frac{7}{16}''$–$\frac{1}{2}''$ in diameter for the finger grip portion 2 and about $\frac{9}{16}''$–$\frac{5}{8}''$ in diameter for the head or disc portion. The length of the finger grip may be about $\frac{1}{4}''$, but, of course, may vary between relatively wide limits. These diameters as just mentioned are considered to be the optimum proportions necessary to accommodate all ears.

In forming this ear protector, the composition as above described is melted down and poured into molds to form the shaped body of wax. These bodies are then preferably coated with an alcoholic primer to provide a preparatory and keying surface for receiving the coating to be next applied. This latter operation consists in coating the finger grip 2 with a special synthetic rubber coating compound, preferably basically

of neoprene. This coating is then cured for about one-half hour, after which one or more additional coatings are applied and successively cured, and the article is then permitted to air vulcanize for about 48 hours. The finger grip portion may then be forged by hammering to cause the rubber jacket or coating to form a stretched collar 4 directly under the unjacketed head or disc-like portion 1. This forging, or swaging, also has a beneficial result in that it aids in breaking down any crystalline portion remaining in the wax, such as may not have been sufficiently affected by the polyisobutylene. The articles as thus constructed may be packed, in pairs, in any type of sanitary package.

In use the ear protector may be removed from its package by grasping the same with the thumb and forefinger about the jacketed finger grip 2—3, and is then placed in the ear with the unjacketed disc-like portion 1 spanning the entrance to the ear canal. The protector is then lightly pressed in place by the finger, which may be removed in a few seconds; that is, after the protector is secured in position in the ear. After it has served its purpose, the protector may be readily removed from the ear by the fingers of the wearer or its adhesion broken by a slight downward pull on the ear lobe. When applied to the ear, the exposed wax of the portion 1 becomes slightly softened by the heat of the flesh and immediately conforms itself to the shape of the part of the ear against which it is pressed, requiring no manipulation and very little pressure to ensure a snug fit between the tragus and the concha of the ear with the entrance of the ear canal completely shut off. Moreover, there is no feeling of annoyance or undue points of pressure, and the device is entirely sanitary and non-irritating. It should also be noted that the rubber jacket encasing the finger grip 2 aids in preventing separation or disintegration of the latter and permits the use of a firm but yielding pressure upon it when inserted in the ear and also when being removed therefrom. Additionally, the rubber coating or jacket of the finger grip 2 avoids any tendency for the protector to adhere to the fingers, which would otherwise tend to lessen the adhesion of the article to the ear or to break the natural suction of the yielding, conforming and adhesive disc-like portion. And, again, the disc portion 1 clings to the ear even with excessive articulation of the lower jaws and the opening and closing of the mouth, thus providing a very effective and practical means for excluding sound, noise, air pressure waves, and water from the ear.

From the foregoing description it will be apparent to those skilled in the art that I have devised a relatively inexpensive ear protector such that all manufacturing operations are subject to close and uniform control; that very little pressure is required to secure a seal across the entrance to the ear canal and the necessary adhesion to maintain it in place; that the design of the protector is such as to avoid any possibility of irritating the ear canal itself; that the use of the jacket 3 of the finger grip avoids the possibility of breaking the seal against the ear when the fingers are withdrawn and also enhances the sanitary features of the protector; and that, as constructed and applied to the ear, approximately the maximum elimination of sound waves capable of passing into the ear canals, viz 50 decibels, is provided.

While this ear protector has been described in considerable detail, both as to dimensions and method of manufacture, it is not intended that the invention be limited thereby but only in accordance with the scope of the appended claims.

I claim:

1. An ear protector comprising an imperforate disc-like body formed solely of wax adapted to fit the concha of the ear and span the entrance to the ear canal.

2. An ear protector comprising a disc-like body formed of a micro-crystalline wax combined with polyisobutylene.

3. An ear protector comprising a disc-like body formed of a micro-crystalline wax combined with petroleum jelly and polyisobutylene.

4. An ear protector comprising a disc-like body formed of a micro-crystalline wax having a melting point of about 175° F. combined with polyisobutylene.

5. An ear protector comprising an imperforate disc-like body formed solely of a mixture of wax and flock and adapted to fit the concha of the ear and span the entrance to the ear canal.

6. An ear protector comprising an imperforate disc-like body formed of wax to fit the concha of the ear and span the entrance to the ear canal, and a finger grip on the rear face of the disc-like body.

7. An ear protector comprising an imperforate disc-like body and a finger grip extending from the rear face of the disc-like body, said body and finger grip being formed of wax.

8. An ear protector comprising a disc-like body and a finger grip extending from the rear face of the disc-like body, said body and finger grip being formed of wax, and a coating of material on the finger grip.

9. An ear protector comprising a disc-like body and a finger grip extending from the rear face of the disc-like body, said body and finger grip being formed of wax, and a coating of rubber on the finger grip.

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