A. A. MICHELSON & J. G. WILSON.

ART OF PROTECTING THE EAR DIAPHRAGM AND APPARATUS THEREFOR.

APPLICATION FILED NOV. 10, 1917.

1,279,396.

Patented Sept. 17, 1918.

Fig. 1.

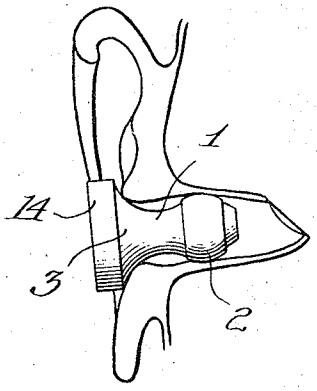


Fig. 2.

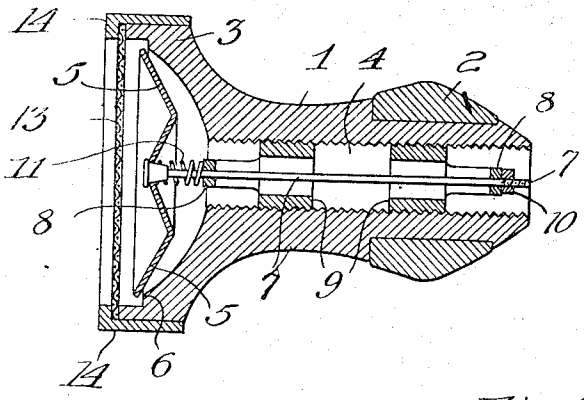


Fig. 3.

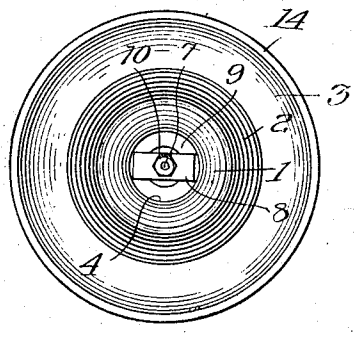
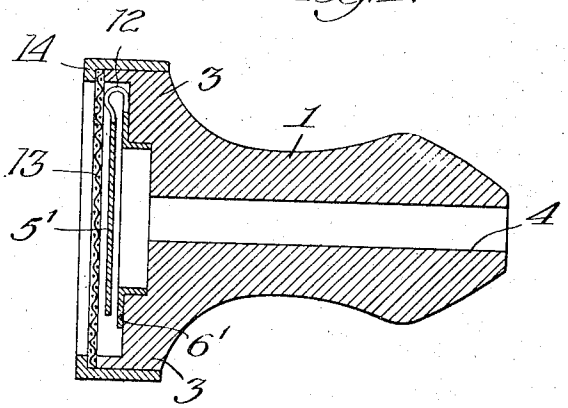


Fig. 4.



Witnesses:

E. E. Gaylord.

Irwin C. Bowman.

Inventors

Albert A. Michelson and

John Gordon Wilson

By Peirce, Fisher & Clapp

Attys.

UNITED STATES PATENT OFFICE.

ALBERT A. MICHELSON AND JOHN GORDON WILSON, OF CHICAGO, ILLINOIS.

ART OF PROTECTING THE EAR-DIAPHRAGM AND APPARATUS THEREFOR.

1,279,396. Specification of Letters Patent. Patented Sept. 17, 1918.

Application filed November 10, 1917. Serial No. 201,411.

To all whom it may concern:

Be it known that we, ALBERT A. MICHELSON and JOHN GORDON WILSON, both residents of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in the Art of Protecting the Ear-Diaphragm and Apparatus Therefor, of which the following is a specification.

The invention relates to improvements in the art of protecting the ear drum or diaphragm and seeks to exclude therefrom excessive air or sound waves due to the concussion caused by the discharge of guns, but without interfering with the admission of ordinary sound waves. The invention consists in the improved art herein described and claimed and in the improved apparatus or ear protector herein described, illustrated in the accompanying drawing and particularly pointed out in the appended claims.

In accordance with the present invention a movable shield or valve-like member is interposed between the ear drum or diaphragm and the outer air and this shield is normally maintained in an open position to admit all ordinary sound waves but in a manner permitting the shift of the shield under impulse of excessive or intense sound waves to a closed position excluding the same.

The apparatus or ear protector preferably employed is shown in the accompanying drawing in which Figure 1 is a view showing the protector inserted in the outer portion of the ear canal. Fig. 2 is a longitudinal section of the improved protector shown on an enlarged scale. Fig. 3 is an inner end view of the device shown in Fig. 2. Fig. 4 is a view similar to Fig. 2 illustrating a modification.

The protector comprises an elongated body portion 1 formed of hard rubber, metal or the like and which is adapted to be inserted in the outer portion of the ear canal and to fit therein in substantially airtight fashion. Preferably, to avoid annoyance to the user, the body portion 1 is recessed to receive an encircling ring 2 of soft rubber or the like which projects beyond the body portion 1 and contacts with the inner wall of the ear canal. Perferably also, to prevent the insertion of the device to too great an extent, the body portion is provided at its outer end with an enlarged hollow head 3 which, when in use, lies just outside the opening of the ear canal.

The body portion is provided with a longitudinal passage 4 extending therethrough and a movable shield or valve-like guard 5 is arranged within the outer hollow head in front of an annular seat 6 which extends about the outer end of the passage 4. In the form shown in Fig. 2, the shield or valve-like member 5 comprises a light, thin sheet metal disk which is preferably formed of aluminum and the peripheral portions of which are preferably inwardly dished or coned. The central portion of the disk as shown, is outwardly dished or coned and is fixed to the outer end of a small wire stem 7. The latter extends through the passage 4 and is guided at its ends in spiders 8 formed on sleeves 9 which, as shown, are threaded into the passage or longitudinal bore 4 of the body portion.

The rear end of the stem 7 is provided with a stop 10 and a light, fine wire spring 11 coiled about its outer end extends between the disk or shield 5 and the adjacent guiding spider 8 and holds the movable parts 5 and 7 in normal position with the stop 10 engaging the inner spider 8 and with the valve-like member or shield 5 open and spaced slightly away from the annular seat 6.

In the form shown in Fig. 4 the shield or guard 5′ is in the form of a flat, thin, sheet metal disk and it coöperates with a flanged seating member 6′ also formed of thin sheet metal and inserted within the enlarged outer end portion of the passage or bore 4. The shield or guard 5′ is held in normal open position slightly spaced from the seat 6′ by a bow-shaped spring 12 which may be formed integral with the shield and its seat.

Preferably as shown, a fine, wire screen 13 for excluding dust and dirt extends over the outer face of the enlarged end or head 3 and is held in place thereon by a flanged collar 14 which fits upon the head.

In operation, the protector is inserted in the outer portion of the ear canal as shown in Fig. 1. Ordinary sound or air waves are readily admitted through the protector since the shield or guard is non-responsive thereto. It is however of light weight and the spring which holds it in normal, inoperative position, spaced slightly away from its seat, is also light so that the shield will readily

respond to the excessive sound waves like those due to the concussion of a gun. The impact or impulse of such excessive sound or air waves against the shield will quickly shift it to closed position in contact with its seat and so exclude or prevent the impact of such excessive waves or vibrations against the ear drum or diaphragm.

It is to be understood that the details herein set forth may be varied without departure from the essentials of the invention as defined in the following claims.

We claim as our invention:—

1. The improvement in the art of protecting the ear diaphragm which consists in interposing a movable valve-like shield between the ear diaphragm and the outer air and normally maintaining the same in open position to admit ordinary sound waves but in a manner permitting the shift of said shield under impulse of excessive sound waves to a closed position for excluding the same.

2. The improvement in the art of protecting the ear diaphragm which consists in interposing between the ear diaphragm and the outer air, a shield non-responsive to normal sound waves but yieldingly responsive to excessive sound waves to exclude the same from the ear diaphragm.

3. An ear protector having a passage therethrough for the admission of normal sound waves to the ear canal and a normally open valve like member responsive to excessive sound waves for closing said passage.

4. An ear protector comprising a body portion having a passage therethrough and arranged to exclude sound waves from the ear canal except through said passage, and a shield normally held in inoperative position but shiftable by excessive sound waves to close said passage.

5. An ear protector comprising a body portion adapted to fit within the ear canal and having a passage therethrough for admitting normal sound waves, and a valve-like shield for closing said passage, said shield being normally spring-held in open position but adapted to be closed by excessive sound waves.

6. An ear protector comprising an enlarged hollow, outer end portion or head and a body portion adapted to fit within the outer part of the ear canal and having a passage therethrough, said head having a seat about the outer end of said passage, and a disk like shield in said head normally spring-held away from said seat but adapted to be shifted to closed position in contact therewith by excessive sound waves.

ALBERT A. MICHELSON.
JOHN GORDON WILSON.