J. B. CAMPBELL.

ARTIFICIAL EAR DRUM.

APPLICATION FILED JULY 1, 1911.

1,045,812. Patented Dec. 3, 1912.

Fig. 1.

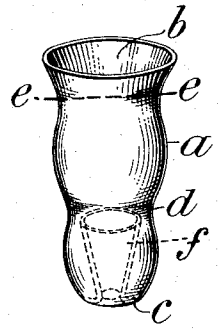


Fig. 2.

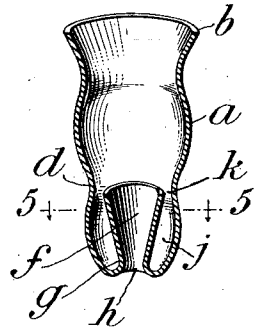


Fig. 3.

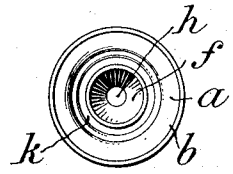


Fig. 5.

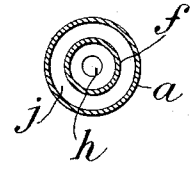
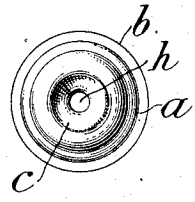


Fig. 4.



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ARTIFICIAL EAR-DRUM.

1,045,812. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed July 1, 1911. Serial No. 636,465.

To all whom it may concern:

Be it known that I, JOHN B. CAMPBELL, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Artificial Ear-Drums, of which the following is a specification.

This invention relates to artificial ear drums, and aims to provide certain improvements therein.

Various devices of this character have been proposed for the purpose of improving defective hearing, one type of which is illustrated in United States Letters Patent granted to me October 30, 1906, No. 834,259.

The object of the present invention is an improved construction of ear drum particularly adapted to this general type, whereby the effect of sound vibrations upon the natural drum of the ear is considerably increased. To this end in the preferred form of my invention I provide a drum having what may be called a megaphone or sound collecting funnel which is preferably disposed at the inner end of the drum, the latter being preferably perforated so that the perforation coincides with the smaller end of the megaphone or funnel. The latter preferably extends outwardly a considerable distance and its larger end is preferably separated from the exterior wall of the drum. The drum and megaphone or funnel are preferably constructed of thin, soft rubber, whereby not only the walls of the megaphone are capable of responding to vibrations, but the megaphone itself is capable of vibration as a body, such vibrations being communicated to the inner end of the drum. The effect of this construction is believed to be that the sound waves are collected by the megaphone and in concentrated or condensed form pass directly through the opening in the rear end of the drum to the natural ear drum, while the vibrations of its walls also are communicated to the natural drum. Preferably the drum is provided with a constricted portion at or near the outer end of the megaphone so that there is formed an annular chamber between the outer walls of the megaphone and the inner end of the drum into which the sound waves which pass around the megaphone are concentrated or condensed. As the inner wall of this chamber is in contact with the natural drum, the latter receives also the vibration of the air contained within it.

The invention includes other features of improvement which will be hereinafter more fully described.

Referring to the drawings which illustrate one form of the invention,—Figure 1 is an enlarged perspective view of the device showing the megaphone in dotted lines. Fig. 2 is a central longitudinal section of Fig. 1. Fig. 3 is a top or plan view of Fig. 1. Fig. 4 is an under side or bottom view. Fig. 5 is a section taken on the line 5—5 in Fig. 2.

Referring to the drawings, let *a* indicate the body of the drum which is preferably formed of very soft, thin rubber or similar resilient material in order to avoid irritating the auditory canal. It is open at its outer end *b*, and is provided with an apex or inner end *c* which is designed to be placed in contact with the natural drum of the ear or to occupy a position closely adjacent thereto. Preferably the drum between its ends is formed with a constricted portion *d*, which broadly speaking is set forth in my aforesaid Letters Patent, and which is designed to strengthen the structure and to tend to prevent collapse thereof. The outer end *b* may be flared outwardly as shown, or the device may be cut off at the point *e* or inwardly of this point. This will be determined largely by the special conditions of each individual ear to which the drum is applied.

An important feature of the invention lies in the provision of a megaphone or outwardly flaring funnel *f* which is preferably constructed of the same material as the body of the drum and forms an integral part thereof. Preferably its smaller end *g* is connected with the apex of the drum as shown, the latter being provided with an opening *h* coinciding with the opening through the smaller end of the megaphone, whereby to secure a free communication between the column of air within the drum and the natural drum of the ear. The larger end of the megaphone may with good effect be located near the constricted portion *d* so as to form an annular chamber *j* surrounding the megaphone, the annular opening to which chamber is somewhat restricted, as shown at *k*. It is preferable that the megaphone be unsupported except

at its smaller end where it joins the apex *c*. By this means it may be given the capability of slight bodily vibrations which are communicated to the apex and thence to the natural drum of the ear.

The chief effect of this construction is believed to be that the sound waves entering the drum are concentrated or condensed by the megaphone and pass through the constricted opening in the inner end of the drum to the drum of the ear. Those waves which pass into the annular chamber *j* are more or less retained due to the restricted opening to this chamber and thereby affect the outer wall of the megaphone, thus increasing its bodily vibrations; they also affect the apex of the drum in contact with the natural drum, these two points being those most susceptible of receiving and responding to the vibrations.

An important feature of the invention is the provision of a free passage through the drum from its apex. This not only permits the concentrated or condensed sound waves to pass directly to the ear drum, but constitutes a ventilating and drainage opening which materially assists in keeping the natural drum in healthy condition. It permits the free egress of any matter which may collect or be formed in the inner ear and avoids the necessity of making perforations in the wall of the drum.

While I have shown in detail one form of the invention, it is to be understood that I do not wish to be limited thereto as various changes can be made therein without departing from the invention.

What I claim is:—

1. An artificial ear drum having a sound-collector adapted to fit within the ear and connected within the drum to the interior thereof, constructed with outwardly flaring walls, the outer ends of said walls being supported out of contact with the drum or the passages of the ear.

2. An artificial ear drum having a megaphone arranged within it, and adapted to concentrate sound waves passing into the drum.

3. An artificial ear drum having a megaphone arranged within it, and adapted to concentrate sound waves passing into the drum, said megaphone having its smaller end connected with the inner end or apex of the drum.

4. An artificial ear drum having a megaphone arranged within it, and adapted to concentrate sound waves passing into the drum, said megaphone having its smaller end connected with the inner end or apex of the drum, and said drum having a passage through its inner end opening into said megaphone.

5. An artificial ear drum comprising a tubular portion and an outwardly flaring sound-collector therein the outer end of which sound collector is out of contact with the tubular portion whereby to form an annular chamber or space with a restricted opening between said tubular portion or sound collector.

6. An artificial ear drum formed with an integral outwardly flaring sound-collector, the outer end of which is supported out of contact with the drum or the passages of the ear and the inner end of which is connected within the drum to the interior thereof.

7. An artificial ear drum formed with an integral outwardly flaring sound-collector, the outer end of which is supported out of contact with the drum or the passages of the ear, and the inner end of which collector is connected with the apex of the drum at its inner end thereof.

8. An artificial ear drum formed with an integral outwardly flaring sound-collector, the inner end of which is connected with the apex of the drum, said drum having a passage through its inner end opening into the interior of said sound-collector, and said sound-collector being supported at its outer end out of contact with the body of the drum or the passages of the ear.

9. An artificial ear drum formed with a passage through its apex, and a sound-collecting member connected with said apex, and having a passage passing through the apex thereof and said member.

10. An artificial ear drum formed with an outwardly flaring megaphone connected to the apex of the drum, said drum having a passage through its apex opening into said megaphone, and said drum having a constricted portion adapted in connection with said megaphone to form a restricted opening to the space between said megaphone and said drum.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN B. CAMPBELL.

Witnesses:
EUGENE V. MYERS,
THOMAS F. WALLACE.