

(No Model.)

A. V. SANFORD.
ARTIFICIAL EAR DRUM.

No. 534,581.

Patented Feb. 19, 1895.

Fig. 1.

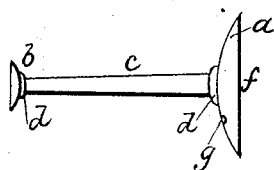


Fig. 2.

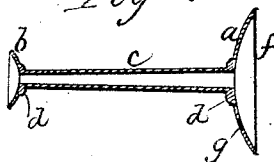
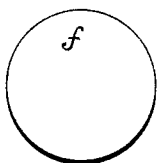


Fig. 3.



Witnesses:

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Inventor.

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UNITED STATES PATENT OFFICE.

ADDISON V. SANFORD, OF ELMIRA, NEW YORK.

ARTIFICIAL EAR-DRUM.

SPECIFICATION forming part of Letters Patent No. 534,581, dated February 19, 1895.

Application filed May 23, 1894. Serial No. 512,202. (No model.)

To all whom it may concern:

Be it known that I, ADDISON V. SANFORD, of Elmira, in the county of Chemung and State of New York, have invented a certain new and useful Improvement in Artificial Ear-Drums; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the drawings accompanying this application.

My invention relates to that class of devices which are made of thin rubber and introduced into the auditory canal, with a pad or filament that rests against the natural tympanum for the purpose of magnifying the sound waves and thereby assisting the hearing. Such devices are well known.

The invention consists of a device of peculiar construction as hereinafter more fully described and embodied in the claim.

In the drawings—Figure 1 is a side elevation of the device. Fig. 2 is a longitudinal section of the same. Fig. 3 is an elevation of the outer end.

This device, consisting of two end plates and a tubular connection, is made entirely of rubber or some equivalent soft material.

a indicates the outer plate; *b*, the inner one, and *c* the connecting tube. The plates are of concave form.

The device is inserted in the auditory canal small end inward, and the small plate *b* is made to fit and cover the natural tympanum, while the outer plate is located outside the passage and serves to receive the vibrations and convey them inward. Both plates are very thin, by which means they are rendered sensitive to the vibrations of the air and there is less tendency to produce irritation and soreness of the auditory canal. Ordinarily the outer plate is about three fourths of an inch in diameter, the inner plate three eighths of an inch, and the tube one inch long; but these sizes may be varied as necessity requires. The backs of the plates, at their junction with the tube, are supplemented by small ribs *d*, forming shoulders, which serve to stiffen the plates at that point without interfering with their flexibility and elasticity. The device forms one integral body.

f is a diaphragm consisting of a very thin

membrane of rubber or any suitable material stretched across the mouth of the outer plate, which latter is provided with one or more perforations *g*, which allows air to pass through and ventilate the ear. This diaphragm serves as a sensitive medium to convey the soundwaves to the ear, and is much more effective than the plates alone. Both plates are made concave as shown, the outer one giving space for proper vibrations of the diaphragm, and the inner one fitting the tympanum of the ear.

Artificial ear drums have before been made with plates at both ends, but usually of the same size. By making them of unequal sizes, as shown in my drawings, the inner one is made to accurately cover the tympanum and thereby cover the nerve tissues, while the outer one covers the opening of the ear passage and concentrates the sound waves so that they are carried to the organs of hearing in the most effective manner. Tubular stems have also before been known.

The device is inserted by a suitable probe which grasps the stem at the inner plate, and when once in place the soft tubular stem adapts itself to the irregularities of the cavity and produces no irritation or inconvenience, while it serves to ventilate the ear and to convey the sound waves to the inner end. The thin diaphragm at the outer end, by reason of its sensitive vibrations to the waves of the outer air, greatly increases the efficiency of the device.

To apply the device in the ear the inner plate is folded down or collapsed like an umbrella, and is then grasped by the pliers beyond the end of the tube and held in that position while being inserted. When fully entered it is released, when it spreads out to cover the tympanum. Usually the pliers are withdrawn slightly to grasp the tube, which latter is then pushed forward to seat the plate. The device is easily applied and removed.

Having described my invention I do not claim broadly a tube with a plate attached at one or both ends, but

What I claim as new, and desire to secure by Letters Patent, is—

An artificial ear drum consisting of a flexible tube, plates at opposite ends integral there-

with, one plate fitting the natural tympanum,
the other resting outside the auditory passage
and having a perforation in its back, and a vi-
bratory diaphragm stretched across the outer
5 plate, as shown and described and for the pur-
pose specified.

In witness whereof I have hereunto signed

my name in the presence of two subscribing
witnesses.

ADDISON V. SANFORD.

Witnesses:

ROBT. W. BUSH,
H. L. HALLIDAY.