

O. REINHARDT.
 APPARATUS FOR THE RECEPTION AND REPRODUCTION OF SOUND WAVES.
 APPLICATION FILED AUG. 22, 1911.

1,064,771.

Patented June 17, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

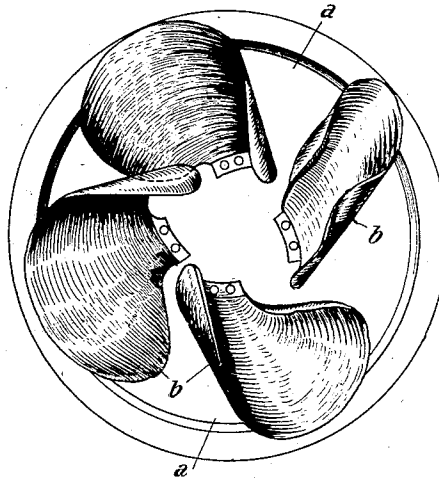


Fig. 2.

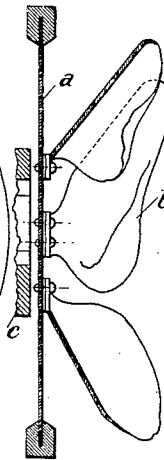


Fig. 3.

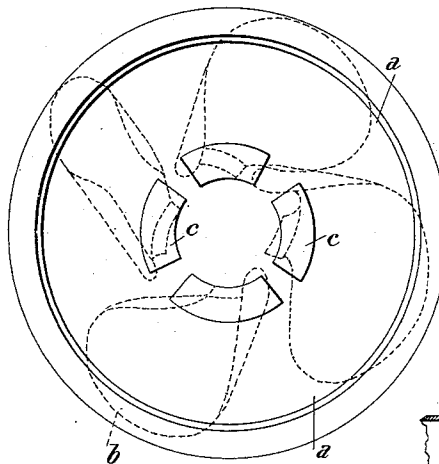
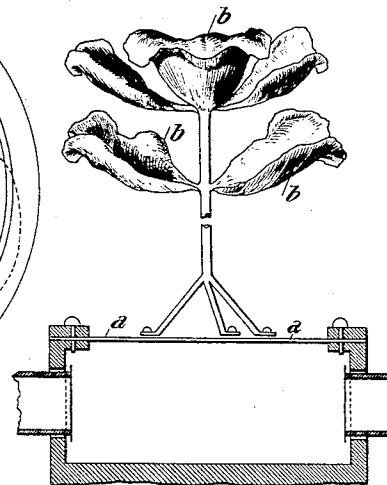


Fig. 4.



Witnesses:
 Hermann Schlosf.
 from New York

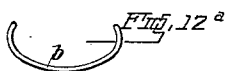
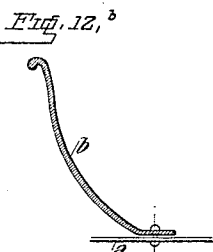
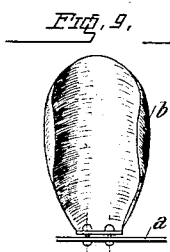
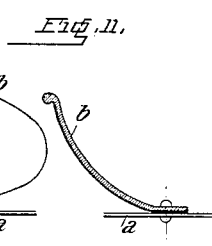
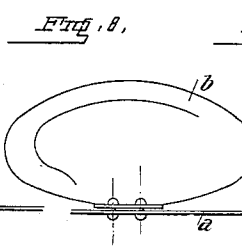
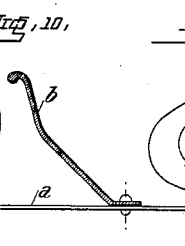
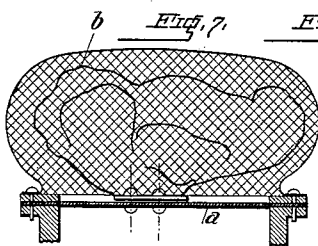
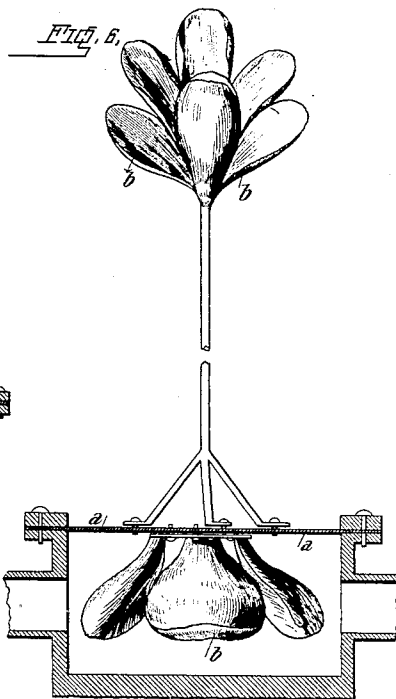
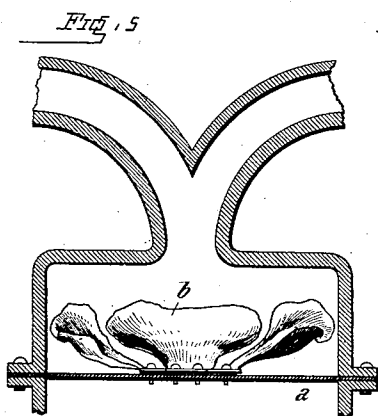
Inventor:
 O. Reinhardt

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2 SHEETS—SHEET 2.



Witnesses:

Hermann Schloß,
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Inventor:

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UNITED STATES PATENT OFFICE.

OSWALD REINHARDT, OF DESSAU, GERMANY.

APPARATUS FOR THE RECEPTION AND REPRODUCTION OF SOUND-WAVES.

1,064,771.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed August 22, 1911. Serial No. 645,373.

To all whom it may concern:

Be it known that I, OSWALD REINHARDT, manufacturer and purveyor to the Court, a subject of the King of Prussia and German Emperor, residing at the city of Dessau, in the Duchy of Dessau, in the German Empire, have invented certain new and useful Improvements in an Apparatus for the Reception and Reproduction of Sound-Waves, of which the following is a specification.

This invention relates to improvements in apparatus for intensifying the acoustic effect of receiving and transmitting apparatus and of optical acoustic devices while completely absorbing all secondary sounds or noises.

More especially the present invention has for its object to secure in the case of electrical and mechanical telephones, microphones, phonographs, gramophones, receiving and transmitting apparatus and other acoustic and optico-acoustic devices of all kinds by means of special arrangements, a clear intonation of the sounds, and the reception and reproduction of even the slightest sound for which an ordinary flatly mounted membrane not provided with such a device would be scarcely suitable.

The invention is based on the well-known principle that detached bodies which are secured at their bases are caused to vibrate by sound-waves coming in contact with them. But as oscillatory bodies of flat shape such, for instance, as membranes without any exterior mounting, if attached to other membranes, oscillate too violently, it is obvious that they will exert a very unfavorable influence on the purity of the tone. To avoid this defect the oscillatory bodies are in accordance with this invention made of a form that is bent and curved in various directions, somewhat in the manner of the human external ear, and are arranged at an angle, for instance, an acute angle, to the direction of the surface of the membrane, whereby they exercise a leverlike action on the membrane with the result that the oscillations, no matter from what direction they may come, are received with very great acuteness, intensity and accuracy.

The greatest advantage of this invention, however, consists in the fact, that as already stated, notwithstanding the intensifying of the oscillation, the vibrating bodies are prevented from oscillating too freely on their own account, and that material thus shaped,

in spite of its oscillations, does not transmit sounds of its own production, but that the acoustic effect is produced only when the oscillations directed toward the membrane come in contact therewith and are again transmitted either to magnets, sounding bodies, sound-resonating bodies, or other substances, which conduct or transmit the sound-vibrations. By this means the harmonics of the known membrane, which is freely suspended above the membrane, the resonance of the hollow body, and the deep tone due to the cavity of the funnel-shaped mouth-piece are entirely silenced.

A device to which the method above referred to has been applied is illustrated by way of example in the accompanying drawings, where—

Figures 1, 2 and 3 show respectively in front view, in section and in rear view, a membrane with variously shaped oscillatory bodies attached thereto. Fig. 4 represents in elevation resonance bodies which are mounted on the extension of the foot and are connected with the membrane which is shown in section, and which for the purpose of receiving the sound is mounted on a sound-box of known type which is provided with acoustic tubes. Fig. 5 represents, partly in elevation and partly in section, resonance bodies mounted externally on a foot and connected with the membrane, these sound-transmitting bodies being mounted on a sound-box of known type. Fig. 6 shows on the one side resonance bodies arranged on an extension of the foot and on the other side oscillatory bodies directly attached to the membrane. Figs. 7, 8 and 9 show in elevation oscillatory bodies of various shapes and Figs. 10, 11, 12^a and 12^b show the same bodies in section.

a is the membrane and *b* the oscillatory body, while *c* represents the body by means of which the acoustic waves are further transmitted.

To enable the sound vibrations to be transmitted by means of the oscillating bodies to the membrane with the maximum intensity, the base of each oscillating body (Figs. 7, 8 and 9) is made as small as possible, being however capable of being strengthened or specially supported. For the reception of sounds coming from a greater distance, for example, out of the air, the resonance bodies may moreover be attached to the membrane by means of

specially prolonged feet. In order to construct sounding chambers specially adapted for receiving and reproducing conversations, the oscillating bodies, as shown in Fig. 6, may be arranged on both sides of the membrane. By this means a sound can be conducted directly into the receiving sound-box and thence into acoustic tubes or other known receiving apparatus. Under such circumstances the outer resonance bodies serve the purpose of receiving the sound and the bodies which are located within the sound-box that of reproducing it or vice versa. To protect them from risk of injury from the outside, the vibratory bodies may be surrounded by a protecting network or cage such as is shown in Fig. 7.

The attachment of the ear-shaped or scoop-like oscillating bodies above described is effected at that part of the membrane where it is desired that the maximum oscillations should be produced. If, for instance, it is desired to act upon a magnet or other object which conducts the vibrations, it is best to arrange them, as shown in Figs. 2 and 3, symmetrically; if on the other hand it is desired that the membrane should vibrate mainly at its center, they are best arranged in the center of the membrane, and either mounted on a foot, one above another, or made in a single piece so as to form a connected body secured at the center and having at its outer end the necessary ear-shaped portions.

By means of the curvatures of various shapes given to the oscillating bodies it is, more especially, possible to prevent the too violent vibration which often occurs in the case of flat membranes mounted on a membrane at right angles thereto, as well as the too intense resonance which often occurs in the case of closed hollow bodies arranged on a membrane, while moreover the deep, hollow tone peculiar to funnel-shaped bodies, is also avoided. The oscillating body serves the purpose of imparting to the membrane the sound vibrations in their most perfect clearness, as they are transmitted to the human or animal ear and of enabling the membrane to transmit them further by means of various devices, which may or may not be of an already known type.

What I claim as my invention and desire to secure by patent is:

1. An apparatus of the character described having a suitably supported membrane; and suitably curved sound-transmitting irregular bodies which are bent irregularly and are mounted lever-like upon said membrane and which are arranged and

adapted to receive sound vibrations and to transmit the same with reinforced strength and with the secondary sounds suppressed.

2. An apparatus of the character described having a suitably supported membrane; and ear-like sound-transmitting irregular bodies which are bent irregularly into a shape resembling that of the human external ear and are mounted lever-like upon and at an acute angle to said membrane and which are arranged and adapted to receive sound vibrations and to transmit the same with reinforced strength and with the secondary sounds suppressed.

3. An apparatus of the character described having a suitably supported membrane; and ear-like sound-transmitting bodies which are provided with an attaching base and are mounted lever-like upon said membrane and which are arranged and adapted to receive sound vibrations and to transmit the same with reinforced strength and with the secondary sounds suppressed.

4. An apparatus of the character described having a suitably supported membrane; and ear-like sound-transmitting bodies which are mounted lever-like upon said membrane and which are arranged symmetrically and adapted to receive sound vibrations and to transmit the same with reinforced strength and with the secondary sounds suppressed.

5. An apparatus of the character described having a suitably supported membrane; and ear-like sound-transmitting bodies which are provided with a centrally-disposed attaching base and are mounted lever-like upon said membrane and which are arranged and adapted to receive sound vibrations and to transmit the same with reinforced strength and with the secondary sounds suppressed.

6. An apparatus of the character described having a suitably supported membrane; ear-like sound-transmitting bodies which are mounted lever-like upon said membrane and which are arranged and adapted to receive sound vibrations and to transmit the same with reinforced strength and with the secondary sounds suppressed; and a cage or network around the bodies mounted on the membrane for the purpose of protecting them from the risk of injury from the outside.

In testimony whereof I have affixed my signature in presence of two witnesses.

OSWALD REINHARDT.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.