C. E. WILLIAMS.

AUDIPHONE RECEIVER.

APPLICATION FILED JAN. 6, 1908.

945,429.

Patented Jan. 4, 1910.

Fig. 1.

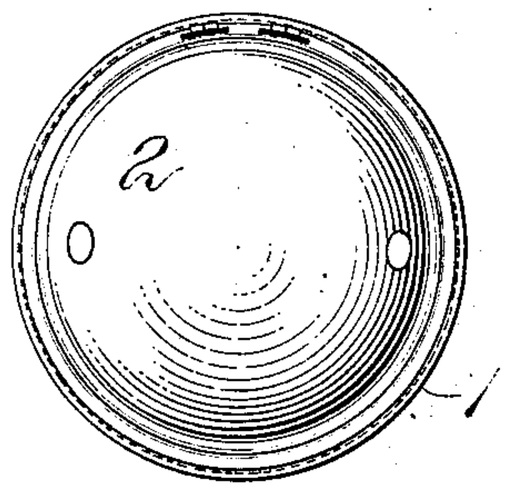


Fig. 3.

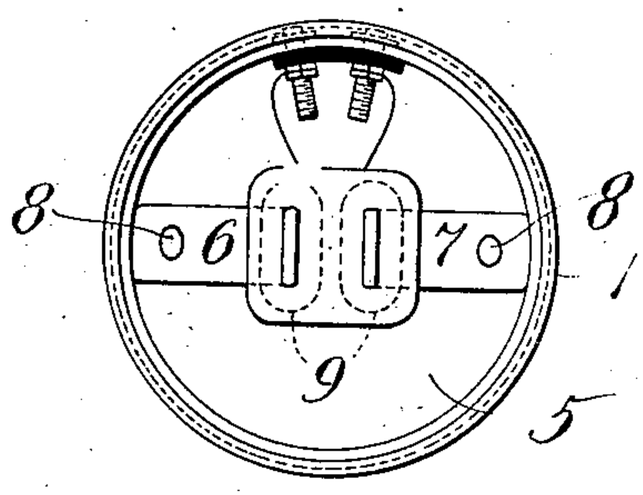


Fig. 2.

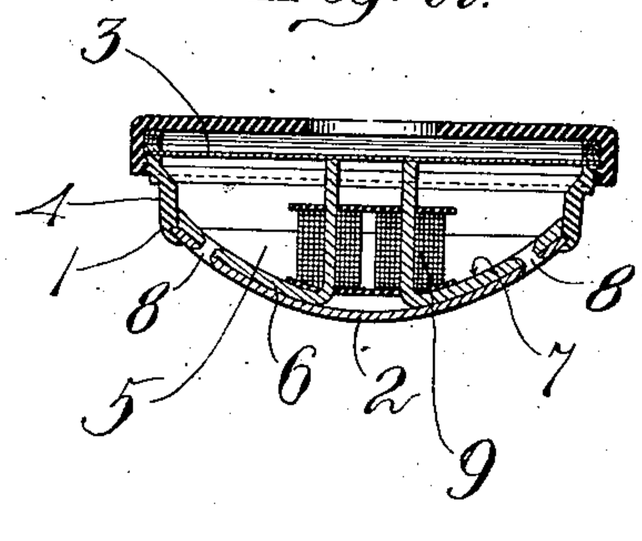


Fig. 4.

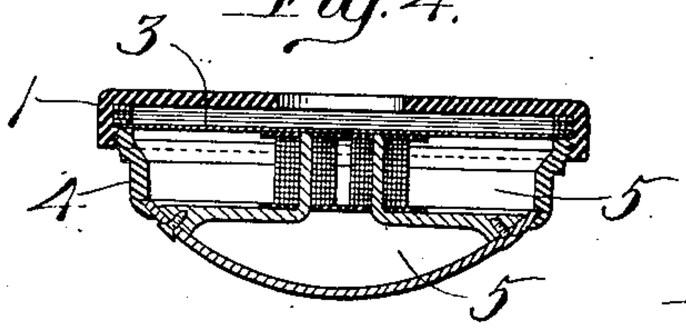


Fig. 5.

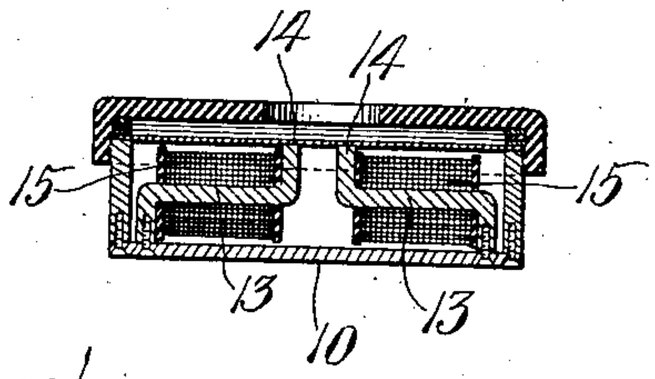
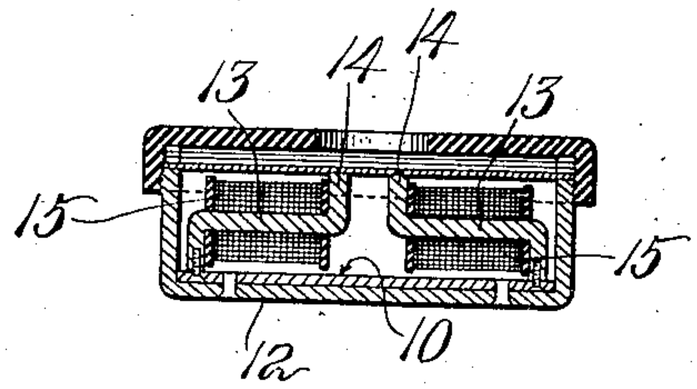


Fig. 6.



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UNITED STATES PATENT OFFICE.

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AUDIPHONE-RECEIVER.

945,429. Specification of Letters Patent. Patented Jan. 4, 1910.

Application filed January 6, 1908. Serial No. 409,430.

To all whom it may concern:

Be it known that I, CHARLES E. WILLIAMS, a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Audiphone-Receivers, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

Audiphone receivers, as commonly constructed heretofore, have required a thick and hence a heavy case to hold and support the usual fixed magnet, and as the latter has been in the shape of a thick ring or horseshoe (to leave the necessary space at the center for the electro-magnet) the acoustic properties of the receiver have been inefficient, there being no room left for a reverberatory chamber, and the permanent magnet and case not only make the receiver heavy, but the necessary location of the former brings it so close to the diaphragm that the flux of the magnetic field polarizes the diaphragm and seriously interferes with the proper working of the instrument.

My invention has for its object the elimination of all the foregoing objectionable features besides introducing various decided advantages.

In accordance with my invention, I provide a more uninterrupted air-space back of the diaphragm, thereby producing a clearer noise and amplifying the sound more. I secure this space by forming the permanent magnet as a part of the case itself, or in other words I introduce into a portion of the case a suitable magnetic material separated from the diaphragm by a non-magnetic substance, and at the center of this shell I mount the electro-magnet. Preferably this shell or permanent magnet-case is concavo-convex, being thereby deeper at the center, so that longer cores can be used for the electro-magnet without interfering with the clear space sought for the reverberatory chamber, said longer cores allowing of more turns of the wire around each core, and a consequently stronger electro-magnet. Furthermore by having the permanent magnet removed, with an intervening reverberatory chamber, the magnetic field is more even, and there is much less polarizing effect on the diaphragm. This construction also renders it feasible to make the receiver much thinner, and of less diameter, and hence less conspicuous when on the head, as the permanent magnet, and hence the case itself, may be cup-shaped. Another point of importance is the economy of manufacture and maintenance.

In the drawings, in which I have illustrated preferred embodiments of my invention, Figure 1 is a view in rear elevation of a receiver showing the magnetic, cup-shaped case; Fig. 2 is a central, transverse sectional view thereof; Fig. 3 is a top plan view with the cap and diaphragm removed; Fig. 4 is a view similar to Fig. 2, showing a different construction of electro-magnet; and Figs. 5 and 6 are similar views of further modifications.

As the main feature of my invention resides in introducing the permanent magnet into the case, so that it constitutes a part of the shell or case, and therefore does not consume any of the interior space of the receiver, it is evident that it may be embodied in a great many constructions. In the preferred embodiment of the drawings, the case 1 consists of a permanent magnet 2 separated from the diaphragm 3 by a rim or ring 4 of non-magnetic or insulating material, an electro-magnet being centrally located within the relatively large and free air-space 5, having its long cores 6, 7 secured to the magnet-case 2 at 8 to coöperate with the poles of the latter at the opposite sides of the periphery of the magnetic portion of the case, and provided with the extra long windings 9, previously mentioned, made possible by the removal of the usual rings of the permanent magnet from the interior space of the receiver and the cup-shape of the case. The construction shown is such that all the parts may be light-weight, as distinguished from the old construction in which a heavy case is required to support and secure the heavy permanent magnet, the latter fills the interior space, shortens the electro-magnet, and brings the magnetic field into undue proximity to the diaphragm.

In Figs. 5 and 6 I have shown further modifications which come within my invention, viewed in its broader aspects, the former figure showing the permanent magnet at 10 as flat or plane instead of being concavo-convex, and the latter figure also showing the permanent magnet as thin and shell-like in shape, being a thin circular plate, the same as in Fig. 5, excepting that instead of being made sufficiently finished to be riveted

in position at its edges as the exterior of the instrument as in Fig. 5, it is supported or retained in position by a thin, non-magnetic backing 12. Also, in order to maintain the large free air space, and at the same time permit the cores of the electro-magnet to have the desired extent and contain the long windings previously explained, I have extended the cores horizontally, as indicated at 13, with upturned ends 14 and windings 15.

The permanent magnet is thin and shell-like forming an inclosed chamber, outwardly bulging so as to provide a reverberatory cavity or chamber.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In an audiphone receiver, a diaphragm, an electro-magnet, and a case of magnetic material extending integrally entirely across the back of the receiver, being insulated from the diaphragm and constituting the permanent magnet of the instrument.

2. In an audiphone receiver, a diaphragm, an electro-magnet, and a case of magnetic material extending integrally entirely across the back of the receiver, being insulated from the diaphragm and constituting the permanent magnet of the instrument, the cores of the electro-magnet being maintained at one end at the opposite sides of the periphery of said magnetic case.

3. In an audiphone receiver, a diaphragm, an electro-magnet, and a case of magnetic material insulated from the diaphragm and constituting the permanent magnet of the instrument, the case having a concavo-convex shape providing a reverberatory chamber about the electro-magnet.

4. In an audiphone receiver, a diaphragm, electro-magnet and permanent magnet, the latter consisting of a thin circular outwardly bulging plate forming an inclosed chamber and the adjacent core-ends of the electro-magnet being secured to the diametrically opposite sides of said plate.

5. In an audiphone receiver, a diaphragm, a permanent magnet having an integral imperforate back portion at the back of the receiver substantially coextensive with said diaphragm, said permanent magnet being provided with cores extending from adjacent the diametrically opposite peripheral edges of said integral imperforate back part, and terminating at their free ends adjacent the middle of said diaphragm, and an electro-magnet wound in two parts respectively about said respective cores of the permanent magnet.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES E. WILLIAMS.

Witnesses;
M. J. SPALDING,
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