E. E. CLEMENT.

ACOUSTIC APPARATUS.

APPLICATION FILED FEB. 19, 1917.

1,306,248. Patented June 10, 1919.

Fig. 1.

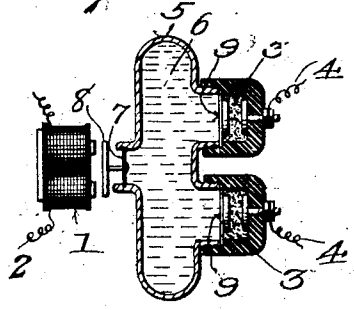
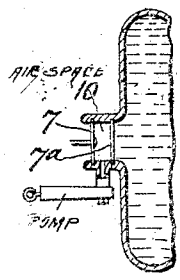


Fig. 2.



Inventor

Edward E. Clement

UNITED STATES PATENT OFFICE.

EDWARD E. CLEMENT, OF WASHINGTON, DISTRICT OF COLUMBIA.

ACOUSTIC APPARATUS.

1,306,248. Specification of Letters Patent. **Patented June 10, 1919.**

Original application filed March 16, 1912, Serial No. 684,365. (Patent No. 1,216,946, dated February 20, 1917.) Divided and this application filed February 19, 1917. Serial No 149,668.

To all whom it may concern:

Be it known that I, EDWARD E. CLEMENT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Acoustic Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to sound transmitting apparatus and particularly to telephonic relays. It has for its object to produce a relay which will effectively reinforce and increase the volume of transmitted sound vibrations, without distortion or loss of sharpness. The principle upon which this invention depends is that expressed in Pascal's law. As the principle is applied, the initial vibrations received through the primary circuit are electromagnetically translated into mechanical vibrations and communicated to a body of liquid over a unit area, and the pressure waves produced in the liquid are then caused to act upon a diaphragm or diaphragms of a variable resistance transmitter having an area or areas suitably proportioned relatively to the said unit area to produce the desired effect. For cushioning purposes, in some cases a body of gas or air preferably under pressure may be employed as a part of the transmitting medium.

This application is a division of my prior application filed March 16, 1912, Serial No. 684,365, upon which Letters Patent No. 1,216,946, were granted to me February 20, 1917.

My invention is illustrated in the accompanying drawings in which Figure 1 is a sectional view of a telephonic relay embodying my invention, and Fig. 2 is a detail section showing the addition of an air cushion.

In Fig. 1, 1 represents an electromagnetic receiver connected with a primary or receiving circuit 2 (which may be telephonic or telegraphic). 3 indicates a variable resistance granular transmitter having juxtaposed electrodes connected in a transmitting circuit 4. In using these terms "receiving" and "transmitting" for the circuits, it is understood that they are descriptive and not limiting; that is to say the circuit 2 may be an incoming circuit, and the circuit 4 may be a local receiving circuit or an outgoing transmitting circuit or the like. 5 is a vessel containing liquid 6, the vessel being shown as entirely closed, provided with a diaphragm 7 connected to the armature 8 of the electromagnet 1 and other diaphragms 9, each connected to one electrode of the transmitter. In the relay shown are two "buttons" or microphone elements, and each has its diaphragm 9 exposed to the liquid. There may be one or many of these elements and diaphragms. It is preferable, however, to use several of these secondary elements or diaphragms for the reason that it permits the different microphones or transmitter elements to be connected in series or parallel, to increase the resistance or the conductivity, respectively, and at the same time affords certain advantages of a large diaphragm without increasing the inertia.

Fig. 2 shows an air space 10 interposed between the diaphragm 7 and a supplemental diaphragm 7^a exposed to the liquid, the idea being to cushion the vibrations. This cushion may be placed between either of the vibratory elements or diaphragms and its corresponding element.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. A telephone repeater comprising a primary diaphragm arranged to respond to electrical vibrations, a plurality of independently vibrating secondary diaphragms arranged to actuate current controlling means in an electrical circuit, and liquid transmitting means connecting said diaphragms, said secondary diaphragms having an aggregate area greater than that of the primary diaphragm and each capable of responding to a frequency higher than that to which a diaphragm of the aggregate area could respond.

2. Sound conveying means comprising a fluid container, a plurality of diaphragms forming part of the walls of said fluid container, a partitioning diaphragm in said container interposed between one of said first mentioned diaphragms and the remaining diaphragms to divide said container into two compartments, a liquid transmitting fluid in one of said compartments, and means for maintaining a gaseous fluid under pressure in the other of said compartments.

3. A telephonic relay comprising an electromagnetic receiving element and a vari-

able resistance transmitting element, with a vessel containing liquid interconnecting them, sound vibrations being transmitted through the liquid from the receiving element to the transmitting element, a diaphragm connected to the electromagnetic element and adapted to act upon said liquid and another diaphragm connected to said transmitting element and adapted to be acted upon by the liquid, together with a gaseous cushion interposed between one of its said elements and its diaphragm.

In testimony whereof I affix my signature.

EDWARD E. CLEMENT.