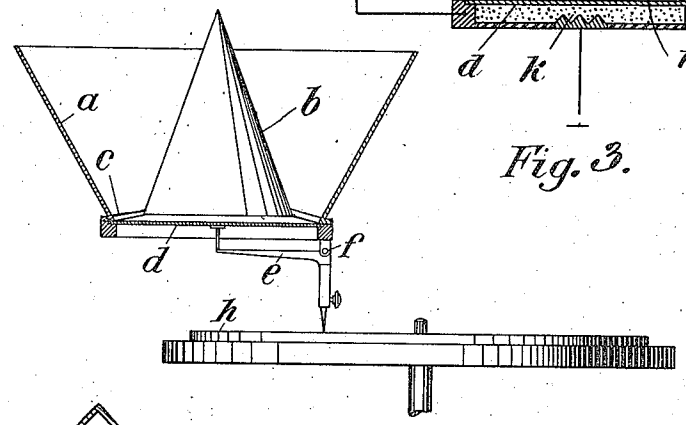
E. M. C. TIGERSTEDT.
SOUND DIRECTING APPLIANCE.
APPLICATION FILED MAY 12, 1915.

1,276,287. Patented Aug. 20, 1918.

Fig. 1.



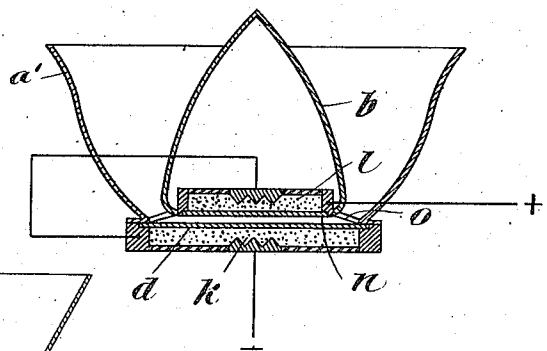


Fig. 3.

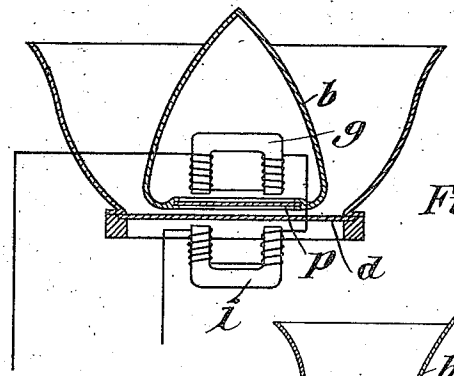


Fig. 4.

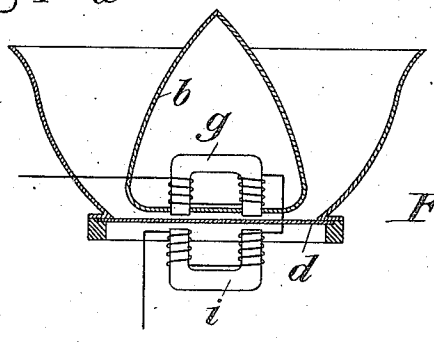


Fig. 2.

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SOUND-DIRECTING APPLIANCE.

1,276,287. Specification of Letters Patent. Patented Aug. 20, 1918.

Application filed May 12, 1915. Serial No. 27,580.

To all whom it may concern:

Be it known that I, ERIC MAGNUS CAMPBELL TIGERSTEDT, a subject of the Emperor of Russia, residing at Copenhagen, Denmark, have invented certain new and useful Improvements in Sound-Directing Appliances, of which the following is a specification.

This invention relates to diaphragms and particularly to such as are used for gramophones, phonographs, talking or recording machines, receivers or transmitters of telephones, or other similar devices in which diaphragms are employed for receiving, recording or producing sound waves.

In devices of the type referred to it was common practice to provide, opposite the diaphragm, a guide for the sound waves, as, for instance, a mouth-piece or the like, having a central opening for the passage of the sound waves. Since the central opening in the guide was usually comparatively small the mass of the diaphragm caused to vibrate by the sound waves was also comparatively small. Thus, with devices, as heretofore constructed, much difficulty has been experienced in transmitting sound waves to somewhat far distances, and no mechanism has, to my knowledge, heretofore been devised embodying any practicable means for enabling a clean transmission of sound waves to far distances so that they will be clearly comprehended at distant places.

The object of the present invention is to obviate the aforesaid difficulties and to correct a vital imperfection. To this end I provide means whereby the sound waves will be conveyed from the rim of the diaphragm to its center and vice versa, thereby enabling the diaphragm to be acted upon by or to produce a greater quantity of sound waves.

In the drawings several constructional forms of the arrangement according to the invention are shown.

Figure 1 is a side elevation, partly in section, of a diaphragm for producing sound waves by means of a record plate.

Fig. 2 is a similar sectional view showing a receiver provided with the invention.

Figs. 3 and 4 are similar sectional views showing two other embodiments of the invention.

Referring to Fig. 1, *d* is a diaphragm from the rim of which extends a diverging funnel or trumpet *a*. In the funnel or trumpet *a* a certain distance apart from and opposite the diaphragm *d* is fixed by means of bands or straps *c* a wall, preferably of special shape—as will be afterward explained—or a cone *b*. The wall or the base of the cone *b* is so arranged in the trumpet *a* as to leave an annular gap for the passage of the sound waves between its circumference and the smaller end of the trumpet *a*.

In the constructional form, as shown in Fig. 1, the diaphragm *d* is vibrated or operated upon by means of a bell-crank lever *e* pivoted at *f* and provided with a stylus which is actuated by the records on the record plate *h*.

In Fig. 2 the invention is shown in connection with a receiver. The general arrangement of the diaphragm *d*, trumpet *a* and cone *b* is similar to that in Fig. 1. In the base of the hollow cone *b* a magnet *g* is provided the coils of which are wound in an opposite direction to the windings of a magnet *i* arranged below the diaphragm *d*. The windings of the two magnets are connected in series in a telephone exchange, not shown. Normally the forces of the two magnets neutralize each other, and, therefore, the diaphragm will remain perfectly plane. In operation the magnetic force of the one electro-magnet will be increased, and that of the other decreased. This arrangement results in perferctly equal over-vibrations of the diaphragm which are independent of the position of the latter. The amplitude of the diaphragm also becomes larger and more vigorous.

The efficiency may generally be still further increased by providing the base of the cone *b* in the form of another diaphragm, as shown in Figs. 3 and 4.

Fig. 3 illustrates the invention as applied to a transmitter. The diaphragm *d* is provided at the smaller end of a mouth-piece *a'* and coöperates with a carbon grain microphone *k*. This carbon grain microphone *k* is connected in series with another carbon grain microphone *l* provided in the hollow cone *b* the base of which forms a second diaphragm *n* opposite the first diaphragm *d*. The sound waves entering the mouth-piece *a'* pass through the annular gap *o* and move in a radial direction to the center of the diaphragms *d* and *n*. At the center they will hit upon each other and cause an energetic vibration of the diaphragms.

The receiver according to Fig. 4 differs

from the construction shown in Fig. 2 in that the base of the cone *b* provides a second diaphragm *p* opposite the diaphragm *d* and that the electro-magnet *g* does not project through the base of but is inclosed in the cone *b*.

I claim:—

1. In a sound directing appliance, the combination of a diaphragm, a funnel, the opening of which is in direct opposition to the diaphragm, and means including a portion provided with a plane surface closely overlying the diaphragm for conveying the sound waves from the rim of said diaphragm to the central portion of the same, and vice versa.

2. In a sound directing appliance, the combination of a diaphragm, a funnel, a cone-shaped element within said funnel, the base wall of said cone being in direct and close opposition to the diaphragm, the base portion of the cone being located centrally within the narrower opening of the funnel, whereby an annular gap is formed between the rim of said opening and the base of the cone, for directing the sound waves from said annular gap near the circumference of the diaphragm toward the central portion of the same, and vice versa.

3. In a sound directing appliance, the combination of a diaphragm, a funnel, a closed cone-shaped element within said funnel, the closing base of said cone being in direct and close opposition to the diaphragm, the base portion of the cone being located centrally within the narrower opening of the funnel, whereby an annular gap is formed between the rim of said opening and the base of the cone, for directing the sound waves from said annular gap near the circumference of the diaphragm toward the central portion of the same, and vice versa; and means for imparting vibrations to said diaphragm.

4. In a sound directing appliance, the combination of a diaphragm, a funnel, a cone within said funnel, a second diaphragm forming the base wall of said cone and in direct opposition to the first named diaphragm, whereby an annular gap is formed between the narrower end of the funnel and the base wall of the cone, for directing the sound waves from said annular gap at the circumference of the first named diaphragm toward the central portion of the same, and vice versa.

5. In a sound directing appliance, the combination of a diaphragm, a funnel, a cone in said funnel, a second diaphragm forming the base portion of said cone and in direct opposition to the first named diaphragm, whereby an annular gap is formed between the narrower end of the funnel and the base portion of the cone, for directing the sound waves from said annular gap at the circumference of said first named diaphragm toward the central portion of the same, and vice versa, and electromagnets cooperating with both of said diaphragms.

6. In a sound directing appliance, the combination of a diaphragm, a funnel, a cone in said funnel, a second diaphragm forming the base portion of the cone and in direct opposition to said first named diaphragm, whereby an annular gap is formed between the narrower end of the funnel and the base portion of the cone, for directing the sound waves from said annular gap near the circumference of the first named diaphragm toward the central portion of the same, and vice versa, and telephone magnets for imparting vibratory motion to both of said diaphragms.

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

ERIC MAGNUS CAMPBELL TIGERSTEDT.

Witnesses:
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A. W. AHLSTADT.