(No Model.)

F. A. RAY.

TELEPHONE TRANSMITTER.

No. 573,294. Patented Dec. 15, 1896.

Fig. 1.

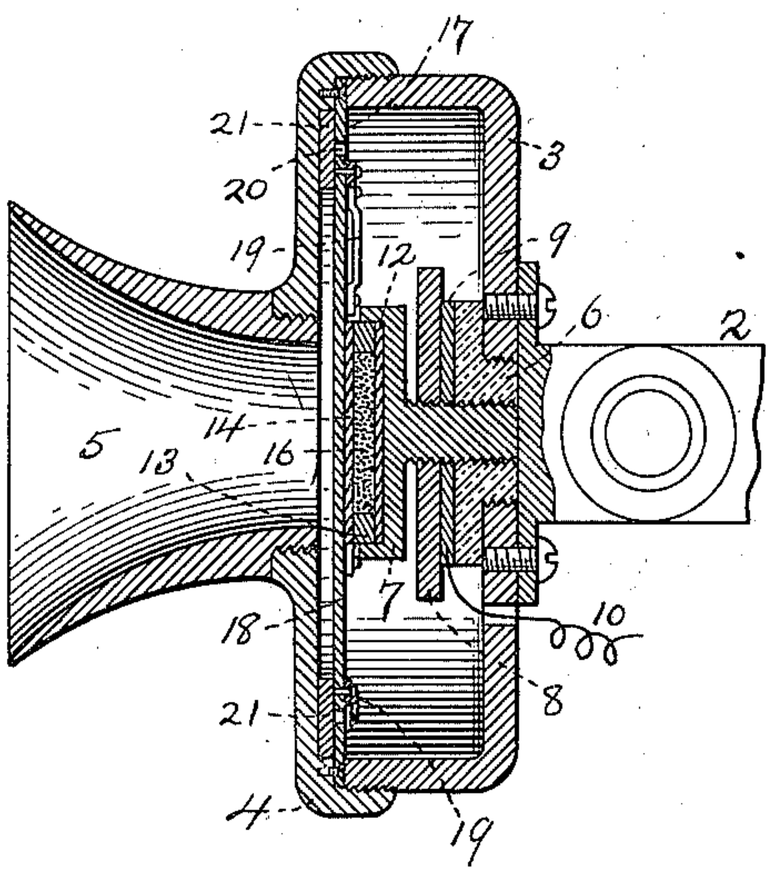


Fig. 2.

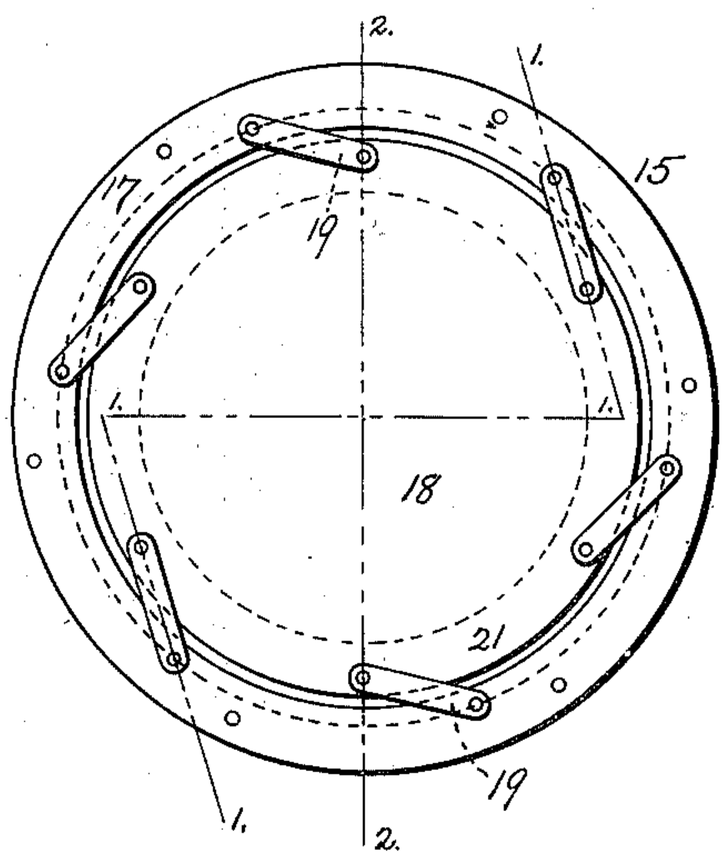


Fig. 3.

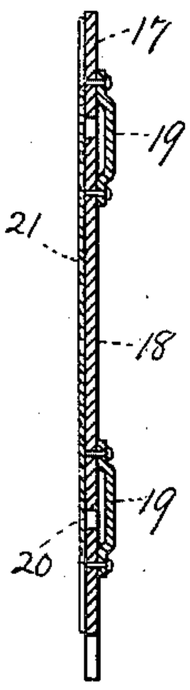


Fig. 4.

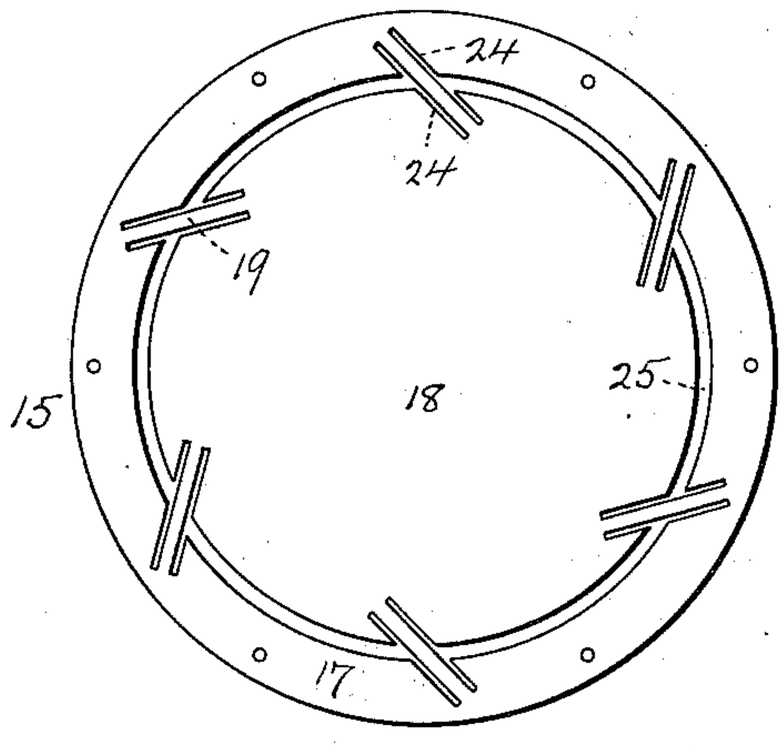
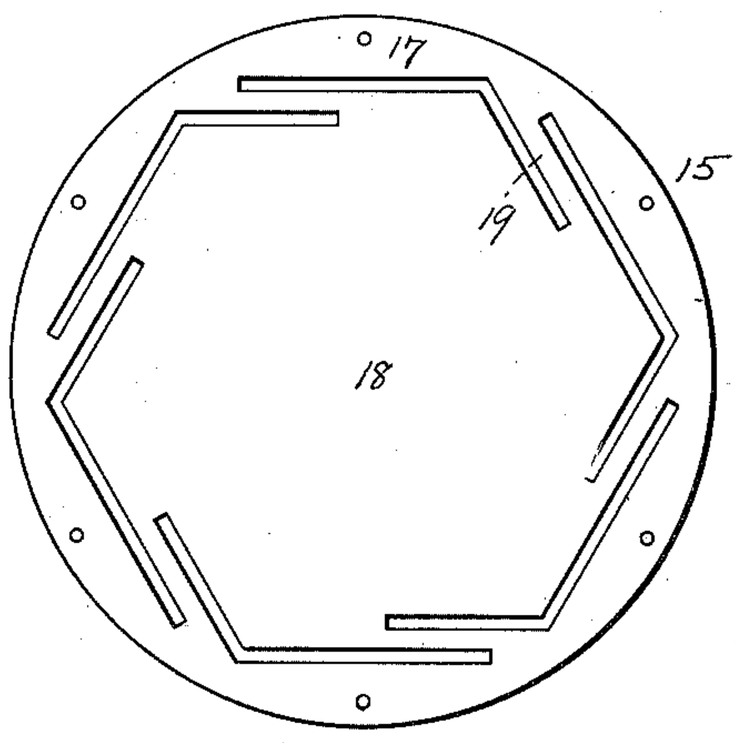


Fig. 5.



WITNESSES

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FOREST A. RAY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HENRY A. CLARK, TRUSTEE, OF SAME PLACE.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 573,294, dated December 15, 1896.

Application filed April 6, 1896. Serial No. 586,289. (No model.)

To all whom it may concern:

Be it known that I, FOREST A. RAY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Telephone-Transmitters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to telephone-transmitters; and it consists in the peculiar arrangement of the transmitter and the construction of the diaphragm, whereby the movements of this element are rendered more susceptible to the sound-waves, and consequently the power of the instrument is amplified, since the sound-waves are more fully made use of, the vibrations are intensified thereby, and the reproduced vibrations are rendered more distinct.

My invention consists primarily in subdividing the diaphragm into two portions or members, one a fixed immovable annular portion and the other a central vibrating disk portion or plate, which is flexibly united with the stationary member, the inner circumference of the fixed ring member and the outer periphery of the vibrating disk member being non-contiguous.

The purpose of my invention is to provide an active diaphragm-disk in which the vibrations shall be practically the same throughout all portions of the disk and thereby avoid the objections which now exist where the diaphragm is an integral plate secured firmly circumferentially and where necessarily, when vibrations occur, the greatest amplitude is at or near the center, decreasing outwardly toward the confined edge portion of said diaphragm.

In the drawings accompanying this specification, Figure 1 represents a portion of a gooseneck to which is affixed a transmitter embodying my invention. Fig. 2 is a face view of a diaphragm embodying my invention. Fig. 3 is a vertical cross-section on line 1 1 in Fig. 2. Figs. 4 and 5 are modifications of the same. In Fig. 1 the transmitter is shown in section on line 2 2 in Fig. 2.

In said drawings, 2 represents the supporting-standard in the shape of a gooseneck and of the usual construction. (Shown in part.) A circular cup-shaped casing 3 is firmly attached to the flange of the gooseneck and a cover or cap 4 is separably secured to the casing and is equipped with a central mouthpiece 5. In the present instance I have shown my invention as applied to a transmitter in which a variable-resistance medium is employed between two electrodes.

The class of transmitters in which a variable-resistance medium in the shape of finely-divided or granular carbon is employed are known as "granular-carbon" transmitters. In the present instance the electrode in a transmitter of this class embodying my invention comprises the following parts: An insulating-block 6 is secured in the shell or casing 2 of the transmitter and contains a central flanged disk 7 as a fixed electrode. This latter is mounted for screw adjustment in the block 6 and held in any position by means of a jam or check nut 8. Furthermore, an interposed metallic plate 9 serves as a terminal for the wire 10. Within the fixed electrode is positioned and fastened a carbon plate 12, while a soft fibrous ring 13 rests within the flange of the disk 7 and is interposed between the carbon plate 12 and a corresponding one 14, made fast by solder or otherwise to the vibrating diaphragm 15. In this way a chamber is formed between the fixed carbon electrode and the movable one on the diaphragm for the reception of conducting material as a variable-resistance medium in the shape of granular carbon, (shown at 16.)

To carry out my invention, I will now proceed to describe the diaphragm, which comprises two portions or members 17 18, respectively, an outer fixed retaining-ring, and a vibrating central disk or active member which is flexibly united with the fixed ring by means of thin steel spring strips or links 19. These strips are preferably arranged as shown, in order to enable the disk to be held or supported at or near the circumference, and likewise in order to enable a longer spring con-

necting-piece to be employed. I do not, however, desire to be limited to the exact number nor to the shape or position of these interconnecting elements. It will be seen that under this arrangement an annular space 20 exists between the two parts of the diaphragm, and hence in some instances I propose to use an interposed annular band 21 to prevent sound-waves from escaping through the aperture which exists in the diaphragm, the latter being considered as a unit. As shown in Fig. 2, this band 21 appears as a flexible membrane, which is fastened to the two parts of the diaphragm by some adhesive compound, or it may be separate therefrom and positioned as in Fig. 1.

As illustrated in section in Fig. 1, the ring 17 is rigidly secured to the cover or cap 4 by screws or other fastening devices, while a ring or band 21 is interposed between the diaphragm and the cover and is to overlap upon the vibrating disk to close the space between the two members of the diaphragm. This circular band, however, is to be of some soft spongy material and is of such a nature as will not sensibly impede or retard the vibrations of the active disk.

From the above description it will be seen that the active member of the diaphragm is non-contiguous to the fixed or supporting member, and since said active member is flexibly supported circumferentially or peripherally whenever wave-sounds strike its surface the tendency of the plate is to vibrate equally and simultaneously at all parts. In this way no wave energy is expended in overcoming the resistance to vibratory action, which increases from the center outwardly toward the point where the ordinary unitary diaphragm is held fixed and immovable as under the usual construction of a single diaphragm. Under my construction it is evident that sound-waves of the least intensity are enabled to produce vibrations at points on the surface of the diaphragm where hitherto the diaphragm has been so rigid as to be unappreciably affected or influenced. Under my method all sound-waves can sensibly affect the active member of the diaphragm. As a consequence an increase in the intensity of the vibrations is caused and a marked improvement in the distinctness and power with which the transmitter enunciates is the result.

In Fig. 4 I have shown a modified form in the construction of a diaphragm under my invention where the diaphragm is unitary, no separate interconnecting strips being used, but merely a series of cuts, which may be produced by a punch or die. Thus two parallel cuts 24, with interconnecting curved cuts or slots 25, serve to produce a diaphragm which operates practically in the same manner as that illustrated in Fig. 2, the interconnecting strips 19′, created by the cuts 24, performing similar duties to the strips 19 in Fig. 2, while the curved slots 25 separate the active member from the fixed member, and equal vibratory movement of the entire surface may occur, since the two are non-contiguous, while they are united by two or more flexible interconnecting elements.

In Fig. 5 a single plate is provided and the two members—a fixed and a vibrating one—are produced by a plurality of angular cuts. These cuts remove a small portion of the material, whereby the central and outer portions are separated from each other, while the two are still united by the flexible strips or links. This transmitter is adapted to bear as high battery-power as could be used with a transmitter, providing the ring 13 is made of asbestos, since the walls of the chamber containing the granulated carbon are then fireproof; that is, the cell consists of the two carbon plates with the ring 13, which latter is likewise fireproof and coöperates with the plates to retain the granular carbon in place.

What I claim is—

1. In a telephone, a diaphragm composed of two parts, a stationary member, and an active member for vibratory movement non-contiguous to the stationary member, the periphery or edge of said active member being unconfined except at requisite points for attachment to the stationary member, substantially as specified.

2. In an electric telephone, a diaphragm consisting of two members, a fixed member or ring, a vibrating disk or movable member non-contiguous to the fixed member, and a plurality of flexible supports which interconnect the two members, substantially as set forth and described.

3. In a transmitter the combination with a fixed annular ring, and a vibratory plate non-contiguous to and concentric within said ring, of a plurality of flexible links which interconnect the edges of the plate with the ring, substantially as stated.

4. In a telephone a diaphragm composed of a fixed ring as a support, a vibratory plate non-contiguous to but concentric within said ring, a plurality of flexible links which interconnect the periphery of the plate with the ring, and a membranous band to cover the space between the two members, substantially as described.

5. In a transmitter, an outer casing, a fixed annular ring therein, a concentric vibrating disk, a plurality of flexible links which interconnect the disk with the ring, and a carbon plate affixed to the disk, combined with a stationary carbon plate, an adjustable electrode, a contact-ring between the two carbon plates, and granulated carbon, as a variable-resistance medium, substantially as explained.

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

FOREST A. RAY.

Witnesses:
H. E. LODGE,
FRANCIS C. STANWOOD.