June 10, 1924. 1,496,919

M. L. BELLUS

AUDIPHONE

Filed Nov. 2, 1921

Fig. 2.

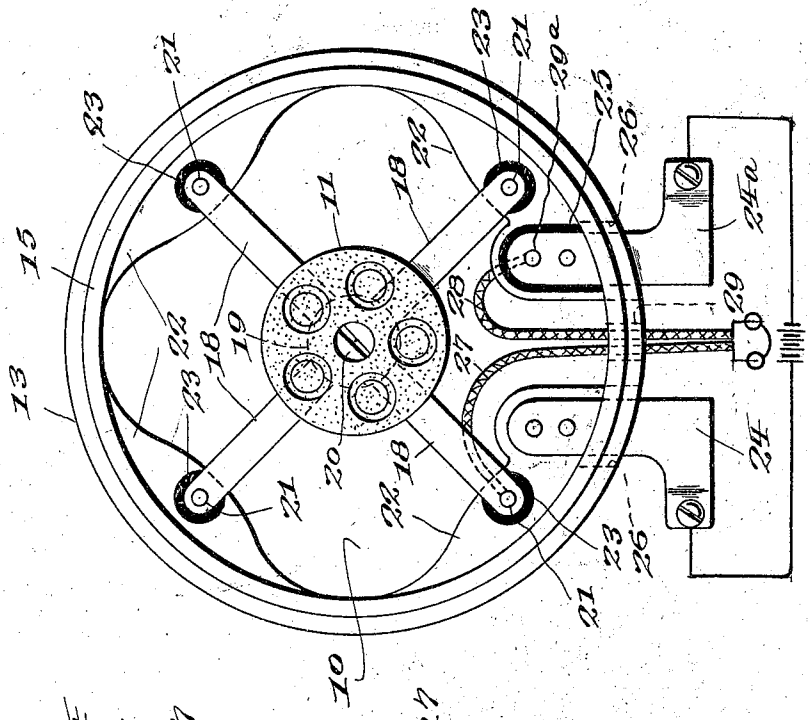
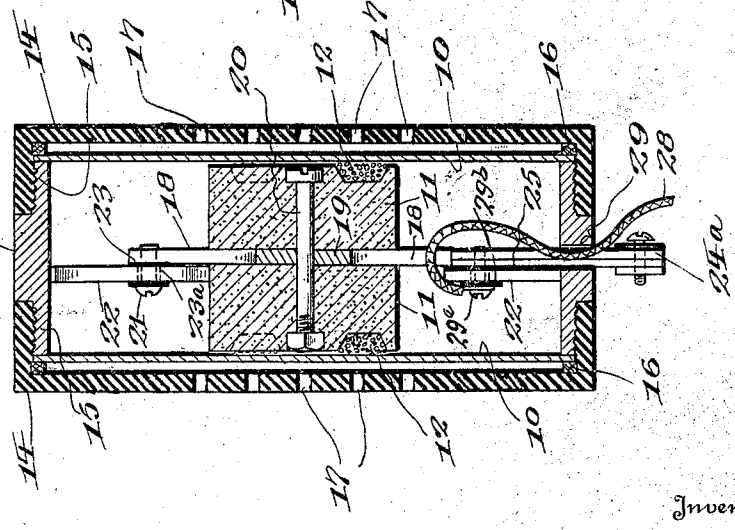


Fig. 1.



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# UNITED STATES PATENT OFFICE.

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## AUDIPHONE.

Application filed November 2, 1921. Serial No. 512,283.

*To all whom it may concern:*

Be it known that I, MARTIN L. BELLUS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Audiphones, of which the following is a specification.

This invention relates to transmitters for audiphones, and its object is to provide a device of this kind embodying certain novel features of construction and modes of operation to be described in detail hereinafter.

In order that the invention may be better understood, reference is had to the accompanying drawing forming a part of this specification, and in said drawing:

Figure 1 is a central vertical section of the device, and

Fig. 2 is an elevation with one of the end caps removed.

The invention contemplates the use of two carbon diaphragms and an electrode for each diaphragm. The diaphragms are shown at 10 and the electrodes at 11. Each electrode consists of a disk or block of carbon having a number of pockets containing carbon granules 12 which are adapted to contact with the diaphragms in the usual manner, so that the vibrations produced in the diaphragm by the sound-waves varies the pressure at the multitude of contacts between the granules, and thus varies the resistance of the circuit, as is well understood in the art.

The instrument includes a casing consisting of an intermediate portion 13 and end caps 14. The intermediate portion is annular and has reduced and exteriorly threaded end portions 15 on which the caps are screwed. The diaphragms 10 are clamped between the caps 14 and the edges of the end portions 15, with gasket rings 16 interposed therebetween. The intermediate portion of the casing is made of metal, whereas the caps are made of hard rubber, and the latter are perforated, as shown at 17 for entrance of the sound-waves.

The electrodes 11 are supported by a metallic spider consisting of a number of arms 18, four being shown, radiating from a hub 19. One electrode is fastened to one side of the spider hub and the other electrode is fastened to the other side of the spider hub. The fastening means for the electrodes may be a centrally located bolt 20. The electrodes are therefore positioned between the diaphragms 10, the outer face of one electrode having the pockets containing the granules 12 being behind one diaphragm, and the corresponding face of the other electrode being behind the other diaphragm.

The outer ends of the spider arms 18 are secured by screws or other suitable fasteners 21 to the ring-like intermediate portion 13 of the casing, the same having flanges 22 on the inside against one side of which the extremities of the spider arms seat and through which the fasteners 21 pass.

The spider arms 18 are insulated from the ring 13 by disks 23 of insulating material interposed between the flanges 22 and the extremities of the arms, and disks and sleeves of insulation $23^a$ between the flanges and the fasteners 21.

To two adjacent flanges 22 are also fastened connectors 24 and $24^a$ whereby the instrument is connected to the terminals of the battery (not shown). The connector 24 is in electric contact with its supporting flange, whereas the connector $24^a$ is insulated from its supporting flange by a strip 25 of insulation. The ring 13 has edge slots 26 through which the connectors 24 and $24^a$ extend to the outside of the casing for attachment to the battery terminals.

The two wires leading to the receiver are shown at 27 and 28, the same entering through an edge aperture 29 in the ring 13 midway between the slots 26. Wire 27 is electrically connected to one of the spider arms 18 by its fastener 21, and it is insulated from the ring 13 by the insulation disk and sleeve $23^a$ of said fastener. The wire 28 is electrically connected to the insulated connector $24^a$ by one of the screws or other fasteners $29^a$ by which said connector is secured to the ring flange, the wire being insulated from said flange by a disk and sleeve $29^b$ of insulation under the head of and around the screw.

The circuit through the instrument is by the way of the non-insulated connector 24 to the ring 13, to diaphragms 10, electrodes 11, spider arm 18 to which wire 27 is electrically connected, by wire 27 to receiver, and from receiver by wire 28 to connector $24^a$. It is to be understood, of course, that the connector 24 is attached to one battery terminal and the connector $24^a$ to the other battery terminal. The receiver has not been illustrated as it forms no part of the present invention. By reference to Fig. 2 it will be

seen that the connectors 24 and 24ª extend to the terminals of a source of current.

The manner of attaching the two electrodes 11 on the same spider is a decided advantage for the reason that both electrodes receive the same amount of flow of electric current. The spider is mounted midway between the edges of the ring 13, which locates the electrodes between the diaphragms 10 and renders practical the use of two such with an electrode for each. The space between the diaphragms forms a practically air-tight sounding chamber which eliminates metallic sounds, and also equalizes the pressure on the diaphragms. In other words, the front diaphragm acts as the back wall of the sounding chamber of the back diaphragm, and vice versa, the back diaphragm acts as a back wall for the sounding chamber of the front diaphragm, and as these walls are not formed of rigid metal but are flexible, metallic sounds are entirely eliminated.

A further advantage of the arrangement of the two diaphragms and electrodes is that the instrument is operative irrespective of the position in which it is held, as the carbon granules 12 on the side toward which the instrument may be tilted will be in contact with the opposite diaphragm. With a single diaphragm and electrode, the instrument is rendered inoperative or very inefficient if it is tilted in a direction to cause the granules to recede from the diaphragm. It will be evident that this position of a double-diaphragm instrument would not render it inoperative because no matter how the instrument might be tilted, the diaphragm on one side would obtain the contact of the granules back of the same. The single casing employed renders the instrument very compact and it can be kept within the same dimensions as a single-diaphragm instrument. The invention results in a double transmitter in a single case, and gives double the sounding space and double the area of the diaphragm. By the double electrodes a greater resistance is obtained, which adds materially to the life of the battery used with the instrument, and as the amount of granules used is also doubled, a greater number of points of contact are obtained, which increases the power of the instrument and makes it louder than a single-diaphragm and electrode instrument. This also permits the use of a battery of a higher voltage than is possible with the usual type of single instruments, and hence the power of the instrument is correspondingly increased.

A further advantage resulting from the duplication of the electrodes and associate elements, is that if one side of the instrument should be disabled, the other side will continue to work. If a single diaphragm instrument becomes disabled by the granules wedging between the electrode and the diaphragm, the instrument is thrown out of commission completely.

I claim:

In an audiphone transmitter, a casing having sound entrance apertures at its ends, diaphragms in the casing behind the apertured ends thereof and spaced from each other, a spider in the casing and consisting of a central hub and arms radiating therefrom, the outer ends of the spider arms being secured to the casing and insulated therefrom, and separate and electrically connected electrodes secured to opposite sides of the spider hub and facing in opposite directions, one electrode being positioned in operative relation with respect to one diaphragm and the other electrode being posisitioned in operative relation with respect to the other diaphragm.

In testimony whereof I affix my signature.

MARTIN L. BELLUS.