(No Model.)

N. LOMBARD.

TELEPHONE TRANSMITTER.

No. 578,520. Patented Mar. 9, 1897.

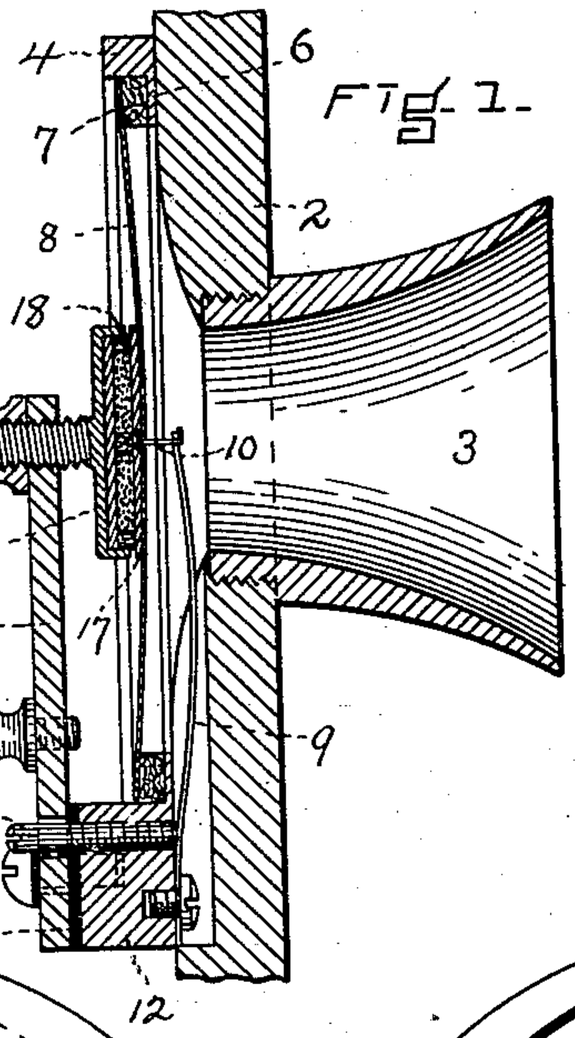


FIG. 2.

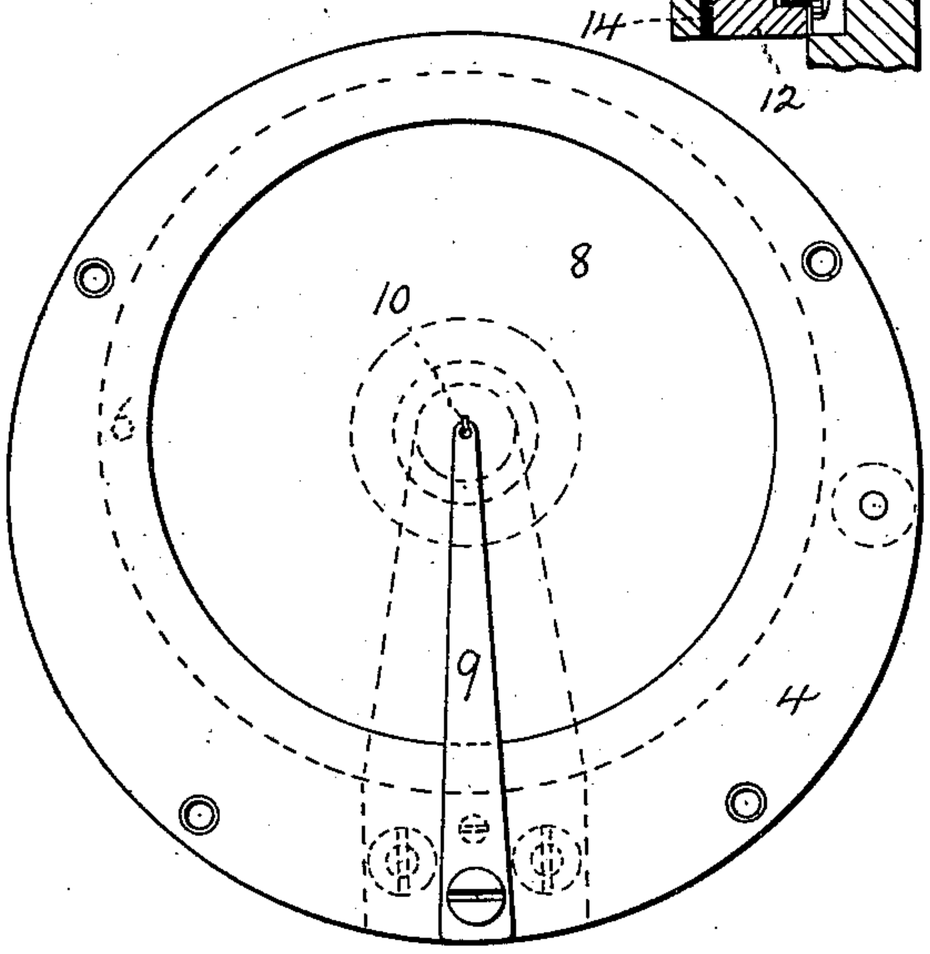


FIG. 3.

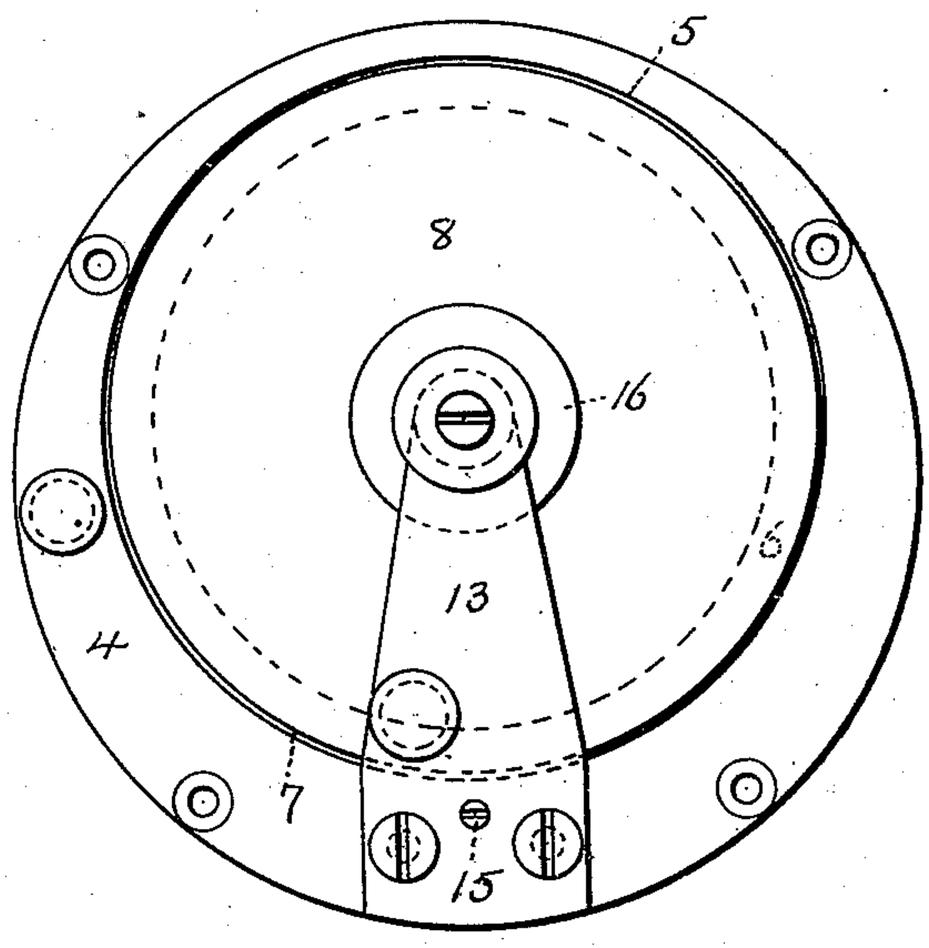
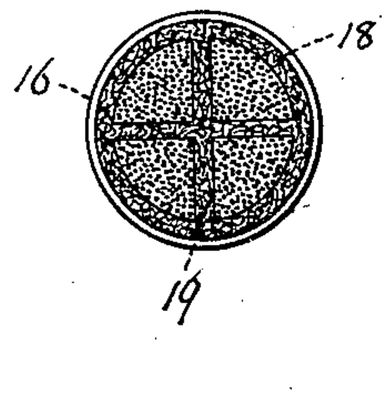


FIG. 4.



WITNESSES-

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UNITED STATES PATENT OFFICE.

NATHANIEL LOMBARD, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO HENRY A. CLARK, OF BROOKLINE, MASSACHUSETTS.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 578,520, dated March 9, 1897.

Application filed June 24, 1896. Serial No. 596,755. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL LOMBARD, 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 improvements in the arrangement and manner of mounting the diaphragm whereby this instrumentality is rendered more susceptible to sound-vibrations and consequently the efficiency of the transmitter is increased, the enunciation being more distinct, while the sounds are intensified.

My invention is embodied in the peculiar mode of mounting the diaphragm whereby the latter is constantly under yielding tension, that is, the plate comprising the diaphragm is to be maintained in a different position from that which it would ordinarily assume provided the inherent or natural disposal or arrangement of the component particles was not disturbed. I instance this peculiar disposition of the diaphragm to the operation of the strings of a musical instrument under tension. I secure this result by placing the diaphragm in such position that the circumferential edge shall rest unconfined by any mechanical fastening device upon the damper-ring on the fixed annular plate which supports the diaphragm. Centrally of the diaphragm I attach a pin, and this is interconnected with a spring the tension of which serves to force the diaphragm from a normal plane surface and renders it slightly convex, the convexity facing the mouthpiece of the instrument. A variable-resistance medium is rigidly mounted upon the opposite or concave side of the diaphragm and is to bear thereagainst in order to subserve the usual function which this element ordinarily performs in telephone-transmitters.

Other peculiar characteristics and the methods of operation will be hereinafter fully set forth and explained.

The drawings herewith presented represent, in Figure 1, a vertical longitudinal section through the mouthpiece and diaphragm of a telephone-transmitter embodying my invention. Fig. 2 is a front elevation of the diaphragm and its holding-ring. Fig. 3 is the reverse side likewise in elevation. Fig. 4 is a plan of the contact-surface of an electrode in which a variable-resistance medium is employed.

In said drawings, 2 represents the casing in part of a telephone-transmitter with the mouthpiece at 3 and the diaghragm-holding ring at 4. This element is firmly affixed to the interior surface of the casing 2 by screws or otherwise, and in the present instance comprises a metallic ring with an eccentrically-disposed circular opening 5, flanged at 6 to receive the damper-ring 7, of soft felt or analogous material. The diaphragm at 8 is circular in shape and preferably of some thin resilient metal, as aluminium, though other material possessing similar qualities may be substituted. The diameter of this is such that it has no contact with the supporting-ring, but is merely laid upon the damper-ring unconfined by any mechanical fastening device and there held in position through the agency of a spring. This instrumentality in the present instance is illustrated as a plate-spring tapering toward its free end, which is interconnected with the central point of the diaphragm by a pin 10 or other device loosely secured thereto to produce a loose or toggle connection. The base of the spring is rigidly fastened to the ring or holder 4, and it is for this reason that the opening 5 is eccentric, thereby producing an increased thickness in said ring where rigidity and stiffness are essential. At a corresponding point on the reverse side is soldered, brazed, or otherwise fastened a block 12, on which is mounted the bracket or arm 13 for the fixed electrode. Said bracket is insulated at 14. Transversely through the block 12 is positioned an adjusting-screw 15, which bears against the base of the spring just above the fastening-point of the latter. This screw serves to regulate the tension of the spring.

Furthermore, said screw is insulated from the bracket 12, through which it passes.

From the above description of the several coöperating parts it will be understood that the diaphragm is a simple flat piece of flexible material, metallic or otherwise, and is to be laid unconfined upon the damper-ring. The pin 10 is headed and formed with a bent extremity, while the free end of the spring is perforated. Hence easy engagement or disengagement of these parts is effected. After the diaphragm is in position upon the flange of the holding-ring and the spring is united centrally to the diaphragm the adjusting-screw is turned until the tension of the spring is sufficient to force the diaphragm from its normal shape, and said diaphragm is compelled to assume a forced position, the surface being concavo-convex with the latter surface turned toward the mouthpiece. Thus it will be understood that the various component particles of the diaphragm are in a disturbed condition, and I define this state as being under tension, since the diaphragm would return to a normal or flat shape if released from the spring.

From the above arrangement of these several elements it will be perceived that the circumferential edge of the diaphragm merely rests upon the damper-ring unconfined by any mechanical agencies and is retained in its position solely by the action of the spring mechanism which serves to retain and maintain the constituent particles comprising the diaphragm in disturbed relation to each other in contradistinction to a static condition.

In the present instance I have shown the transmitter as equipped with an electrode composed of a variable-resistance medium in the shape of finely-divided or comminuted carbon. This carbon is confined in a circular cup 16, adjustably mounted at the upper end of the arm 13 upon a screw, whereby proper contact of said cup electrode 16 is had with reference to a thin sheet of carbon 17, fastened to the diaphragm. This electrode is faced with felt 18, while its interior is subdivided with one or more partitions 19, which create a plurality of cells adapted to contain the carbon. Thus by subdividing the resistance medium packing together of the carbon is prevented, and the efficiency of the electrode is much increased.

In the operation of this transmitter I explain its advantage by saying that the construction is such that the vibrations of the diaphragm may occur without materially changing the tension of the spring, which is supposed to be constant under a certain adjustment. Now, since this diaphragm is under tension and in suitable contact with the fixed electrode, it follows that wave sounds striking the convex surface will produce vibrations which will effect the variable-resistance medium in a more defined and definite manner, since the diaphragm is under a fixed determinate tension and tends to return at once to its normal position. In this way the sounds produced are more clearly enunciated and intensified than when produced by a diaphragm which returns to its normal position only through the inherent tendency of its constituent molecules temporarily disturbed by sound-waves.

What I claim is—

1. In a telephone-transmitter, an apertured supporting-ring, an internal circumferential flange thereon, a diaphragm loosely resting upon said flange, a pin centrally of said diaphragm, and a spring having its free end connected with the pin, the tension of said spring serving to normally maintain the diaphragm in a concavo-convex position.

2. In a telephone-transmitter, a vibrating diaphragm consisting of a flexible plate adapted for support within a stationary holder and without mechanical attachment thereto, a loose pin centrally from the surface of said plate, and spring mechanism to maintain the surface of the plate convex toward the mouthpiece of the transmitter.

3. In a telephone-transmitter, the combination with the casing, a mouthpiece, a fixed apertured supporting-ring, and a stationary arm carrying an electrode for variable resistance, of a vibrating diaphragm resting within the ring, and spring mechanism which maintains the diaphragm in position, said mechanism being attached to the center of the diaphragm, substantially as specified.

4. In a telephone-transmitter the combination with a casing, a mouthpiece therefor, a stationary apertured holding-ring, a fixed arm carrying a single electrode, of a vibrating diaphragm suitably supported in said ring, and one or more partitions extending across the electrode to create a plurality of conjointly-operating cells in the surface of the electrode contiguous to that of the diaphragm, substantially as described.

5. In a telephone-transmitter, an inclosing casing, a mouthpiece therefor, a stationary apertured holding-ring secured to said casing, a fixed electrode formed with a plurality of cells to contain granular carbon as a variable-resistance medium, an upright arm to uphold said electrode and attached to but insulated from said ring, combined with a flexible diaphragm supported on the holding-ring without attachment thereto, spring mechanism from a central point in said diaphragm, and means to adjust said spring mechanism, whereby the diaphragm is compelled to vibrate while under tension, substantially as set forth and stated.

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

NATHANIEL LOMBARD.

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