

(No Model.)

J. V. CAPEK.
TELEPHONE TRANSMITTER.

No. 506,415.

Patented Oct. 10, 1893.

Fig. 1

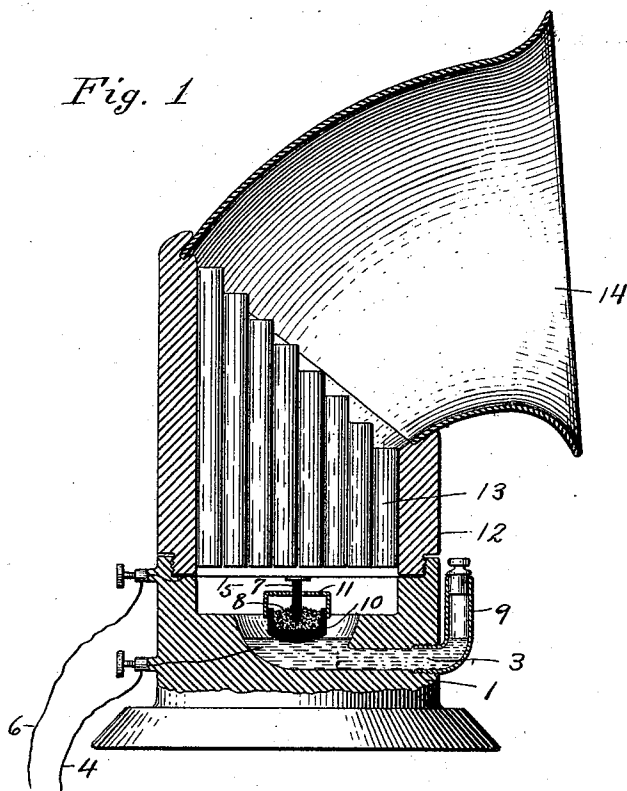


Fig. 2.

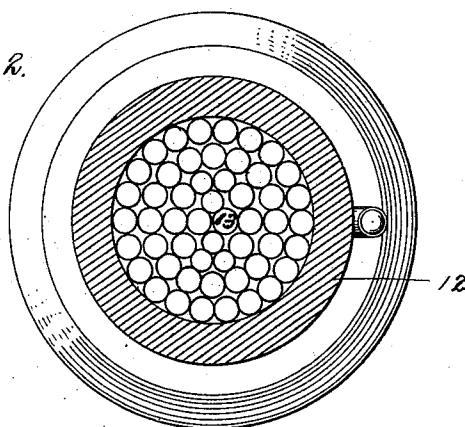
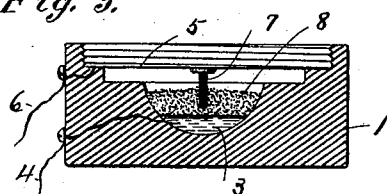


Fig. 3.



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JOHN V. CAPEK, OF NEW YORK, N. Y.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 506,415, dated October 10, 1893.

Application filed July 19, 1893. Serial No. 480,918. (No model.)

To all whom it may concern:

Be it known that I, JOHN V. CAPEK, of New York city, New York, have invented certain new and useful Improvements in Telephone-Transmitters, of which the following is a specification.

My invention relates to electric telephone transmitters of the character employing powdered or comminuted carbon or similar conducting material in the portion adapted to vary the resistance of a suitable telephone circuit in accordance with sounds made in proximity to the transmitter, for transmitting said sounds, or rather electric waves corresponding thereto, to a distant receiver.

In the accompanying drawings which illustrate the invention, Figure 1 is a central vertical section of the preferred form of the improved transmitter. Fig. 2 is a sectional view on line 2, 2, of Fig. 1; and Fig. 3 is a central vertical section of a second form of transmitter.

Transmitters of this class consist, mainly, of a diaphragm, with an air chamber or column in front of it, a mass of comminuted conducting material in a cup or receptacle, and circuit connections through the same, such that vibrations of the diaphragm vary the resistance of the telephone circuit. This form of resistance has presented difficulties preventing perfect operation of the transmitter. When the conducting particles have been filled loosely into their receptacle, the resistance has been found to vary owing to the shifting of the particles caused by handling or otherwise agitating the instrument until they finally become packed, when the transmitter has become inactive. On the other hand, when the conducting particles have been originally filled tightly into their receptacle, the transmitter has not been sufficiently delicate. I overcome these and other difficulties.

According to my invention, the comminuted conducting material forming a part of the resistance varying device is provided with a yielding cushion, preferably but not necessarily of mercury, and the arrangement is such that when the diaphragm vibrates forward it does not compress the comminuted material, an amount equal to the forward movement of the diaphragm, nor does it press

the contact carried by the diaphragm bodily into the comminuted material a distance equal to such forward movement of the diaphragm as in certain old instruments, but the diaphragm electrode in moving forward causes the comminuted material to gradually yield before it owing to the cushion above referred to. During the return movement of the diaphragm the conducting granules not only rearrange themselves by their own gravity, but are also bodily carried back by the cushion.

One form in which my improvement may be embodied is shown in Fig. 3 in which 1 is a cup-shaped body containing a quantity of mercury 3, to which one circuit wire 4, may be connected. 5 is a diaphragm covering the cavity of cup 1, and to it may be connected the other wire or terminal 6, of the telephone circuit. 7 is a conducting electrode carried by the diaphragm and extending into the comminuted carbon 8.

A preferred form of instrument is shown in Fig. 1, in which the cup-shaped body, the liquid cushion and the diaphragm and its electrode are arranged as above described and have corresponding reference numerals. From the interior of cup 1, a bent glass tube 9, extends to the outside through which the mercury may be filled or emptied, and which allows the liquid to yield more readily when the vibrating diaphragm presses down on its surface. Instead of placing the comminuted carbon directly on the mercury it is here placed in a carbon or similar cup 10, which rests on the mercury. The electrode, 7, extends through the central perforation in an insulating cover 11, and this serves to hold the cup in a central position on the cushion.

Transmitters made on the principle described are not subject to a continually varying resistance owing to shifting of the particles when the instrument is jarred, nor does objectionable packing occur. The contact has a considerable area, but is sufficiently sensitive and is such that the continuity of the circuit (which is the primary of the induction coil when such coil is used as is generally the case) is insured under any vibrations which can be given to the diaphragm by the sounds to be transmitted. Hence the disagreeable rasping noise often heard in other telephones is avoided. While the cushion

ion buoys up the carbon, it does not cause a tension or initial pressure against the diaphragm electrode and the diaphragm, but said electrode will rest among the carbon particles as freely as it would in a liquid.

As above indicated the cushion, when the instrument is used, gradually yields under the forward movement of the diaphragm electrode and then follows said diaphragm back. This obviates the digging of a cavity in the comminuted carbon by the diaphragm electrode and consequent injury to the circuit as would occur without the cushion.

While both instruments illustrated have horizontal diaphragms, this is evidently not essential, neither is it essential that the cushion should form a part of the circuit.

It is found that this and other transmitters do not transmit all sounds with equal distinctness, and in order to cause my transmitter to transmit different sounds equally well I have subdivided the vibratory element in front of the diaphragm thereby forming an intensifier or "gamut" as I call it, as shown in Fig. 1.

12 is a tube adapted to rest above the diaphragm, as shown, and contains parts corresponding to all the tones of the musical scale. Preferably these parts are small tubes 13, of the same size and different lengths or of different sizes and the same lengths, so that the air columns in the different small tubes shall have different fundamental tones. There may be one or more tubes for each tone of the scale. Thus any sound will find a part in the transmitter which it can throw into sympathetic vibrations and will be reinforced thereby. In ordinary telephones, there are but two parts capable of such sympathetic vibrations—the diaphragm and the single air column before it.

14 is a mouth-piece or sound-collector attached to the upper end of tube 12. This intensifier when removed from the telephone and provided at its lower end with an ear-piece makes an excellent hearing tube, making it possible to hear sounds otherwise inaudible.

I claim—

1. The combination, in a telephone transmitter, of a diaphragm or body adapted to be vibrated by sound waves, a mass of comminuted conducting material forming a part of the resistance varying device, and a liquid cushion for said comminuted conducting material, substantially as described.

2. The combination in a transmitter, of a diaphragm or body adapted to be vibrated by sound waves, a mass of comminuted conducting material, an electrode extending from the diaphragm into the conducting material and a liquid cushion, substantially as described.

3. The combination of a diaphragm, a carbon pencil thereon comminuted carbon into which the pencil extends and a mercury cushion for the comminuted carbon, substantially as described.

4. The combination of a diaphragm, an electrode therefor, a cup containing comminuted conducting material and a liquid cushion supporting said cup, substantially as described.

5. The combination with a telephone diaphragm of a sound intensifier containing parts tuned to correspond to the several notes of the gamut, whereby all sounds will produce sympathetic vibrations, substantially as described.

6. The combination with a telephone diaphragm, of a sound intensifier having several air columns in front of the diaphragm, and differently proportioned so as to respond to different rates of vibration substantially as described.

7. The combination with a telephone diaphragm, of a sound intensifier having differently tuned parts and a mouth-piece or sound collector, substantially as described.

8. The combination in a sound intensifier, of a tube or body 12, and tuned tubes 13, therein corresponding to the notes of the gamut and adapted to intensify sounds of different pitches, substantially as described.

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Witnesses:

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