(No Model.)

E. BERLINER.

TELEPHONE TRANSMITTER.

No. 291,866. Patented Jan. 15, 1884.

Fig. 1.

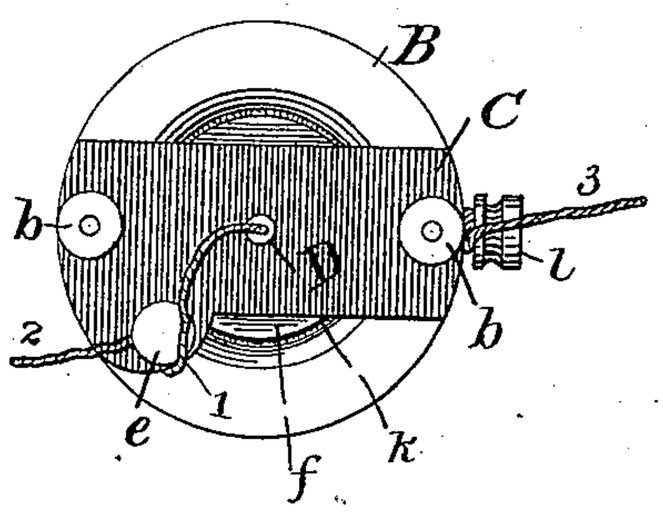
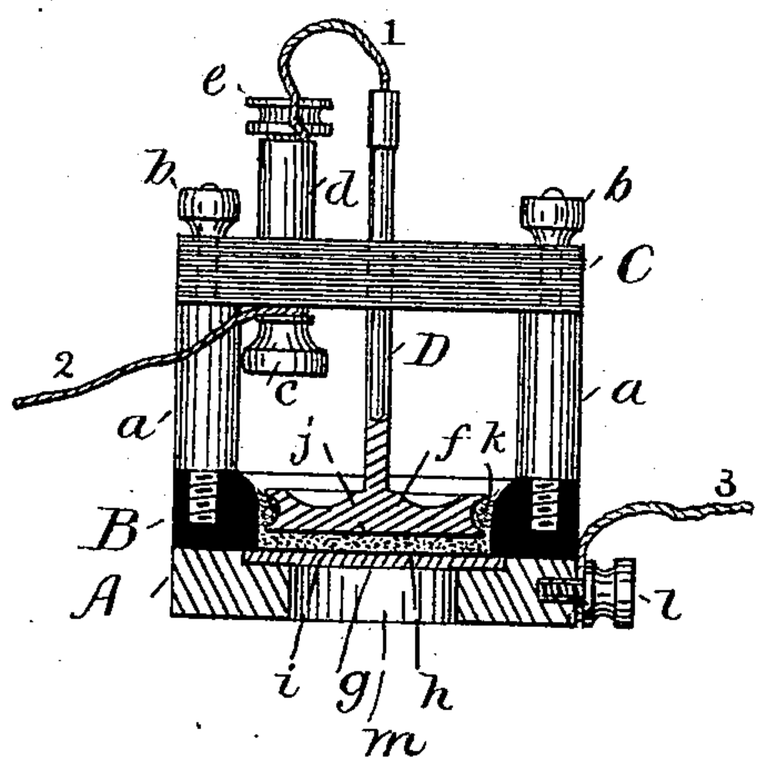


Fig. 2.



Witnesses,
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UNITED STATES PATENT OFFICE.

EMILE BERLINER, OF BOSTON, MASSACHUSETTS.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 291,666, dated January 15, 1884.

Application filed October 5, 1883. (No model.)

To all whom it may concern:

Be it known that I, EMILE BERLINER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Telephone-Transmitters, of which the following is a specification.

My present invention relates to that class of transmitting-telephones in which the variation of the strength of current flowing in the circuit is effected by varying the resistance of a mass of crushed or granulated conducting particles included in the said circuit, such variation of resistance being the consequence of the greater or less compression of the mass, when subjected to the influence of a vibrating diaphragm.

It consists in the specific nature or character of the substance employed as a variable resistance, and also in the combination of the same with other specific devices, whereby improved results are attained.

In Letters Patent granted to me September 18, 1883, numbered 285,102, I have shown and described a transmitting-telephone in which loose particles of conducting material in a dry condition are kept in contact with one another by a weight resting permanently upon the mass. I have, however, ascertained by experiment that certain beneficial results are obtained in transmitters when the finely-divided conductor, instead of being used in a dry and powder-like form, is moistened with some liquid of comparatively low conducting power, so as to form a moist mass, resembling, and of the consistency of sand when sufficiently dampened for the particles to cohere. By applying the variable resistance in this form, I find that articulation is greatly improved, and, furthermore, that the particles being mechanically united have a less tendency to escape from the cavity in which they are placed. To this end I make a mechanical mixture of small carbon particles—such as lamp-black, granulated coke, or other pulverized or granulated conductor—with water or other liquid of comparatively low specific conductivity. In my improved transmitter I also use a grooved weight—as the upper electrode—and loosely pack the groove thereof with felt or some similar soft substance, so that the weight may be enabled to work freely in the cavity in which the variable resistance is deposited, without any undue friction against the walls of the said cavity.

In the drawings, which illustrate and form a part of this specification, Figure 1 is a plan view of an embodiment of my improvement; and Fig. 2 is a sectional elevation thereof, the lower part being broken away so as to show the working parts.

In the instrument herein shown B is a ring or short hollow cylinder of non-conducting material in which are inserted pillars *a a*. These pillars form the support of a non-conducting top piece, C, which is perforated at the ends for the screw ends *b* of the pillars at the center for a purpose which will be hereinafter described, and at its side projection for the insertion of the conducting-bolt *d*, which at its ends is furnished with binding-screws *c* and *e*. The hollow formed by the space inside the ring B is made to serve as a containing-chamber in the following manner: A metal diaphragm, *g*, is stretched across the base of the said space, and is preferably surmounted by an inner diaphragm of platinum, *h*. These are kept in place by the attachment of a cap, A, which is fastened to the casing-ring B, and which compresses the edge of the diaphragm between itself and the lower surface of the said ring. A binding-screw, *l*, is inserted in the cap, whereby one of the leading-out wires may be attached, and the said binding-screw is electrically connected with the diaphragm *h*, either by a wire passing through the substance of the cap or by forming the cap itself of metal. A weight, *f*, of any suitable conducting material is caused to fit loosely in the chamber thus formed, and is provided with a grooved edge, in which a soft and loose packing of felt or similar material is placed, whereby the friction against the walls of the chamber is prevented. The weight is preferably furnished with a platinum facing, J. The weight *f* has a shank, D, projecting upward and sliding through the center hole in the top plate, C, which thus serves as a guide for the weight. In the cavity between the said weight *f* and the diaphragm *g* the variable resistance *i* is placed. This is constituted by making a mechanical mixture of finely-divided particles of carbon or other suitable conductor with water or other similar partial liquid conductor. This formed

into a loosely-adhering moist mass, and placed in the cavity between the weight and diaphragm, produces unusually clear articulations, and the homogeneousness of the mass prevents the escape of stray granulations which would otherwise have a tendency to occur.

In practice it will be found necessary to affix a mouth-piece to the orifice *m* leading to the diaphragm *n*.

One of the circuit-wires, 3, is attached to the binding-screw *l* and the other wire, 2, to the binding-screw *c*. The binding-screw *c* is electrically connected with the metal rod D by means of the conducting-pin *d*, binding-screw *e*, and connecting-wire I.

To operate this apparatus it will be necessary to include it by means of the wires 2 and 3 in the circuit of a voltaic battery, which also includes a speaking-telephone, and when so connected the electrical undulations are produced by vibrating the diaphragm with the voice in a manner well understood.

I claim—

1. In a telephone-transmitter, a variable resistance, consisting of a mechanical mixture of small conducting particles—such as lamp-black or granulated coke—with water or other liquid of low conductivity.

2. The combination, in a telephone-transmitter, of a vibrating diaphragm, a weight, and a non-conducting ring, the whole constituting a chamber of which the diaphragm forms one side, the weight the other, and the inner surfaces of the ring the walls thereof, with a variable resistance placed in the chamber thus formed, and consisting of a damp conducting mass produced by mixing granulated carbon particles with water or some other semi-conducting liquid.

3. The combination, in a transmitting telephone, of the containing-cavity, the moist carbon mass formed by adding a partially-conducting liquid to granulated carbon, the conducting-weight peripherally grooved, and the soft and flexible packing for the said groove, all substantially as hereinbefore described.

4. In a telephone-transmitter, the combination of a sliding weight adapted to be acted upon by sound-waves, and a packing of felt or similar soft material around said weight.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 3d day of October, 1883.

EMILE BERLINER.

Witnesses:

FRED J. F. SCHWARTZ,

GEO. WILLIS PIERCE.