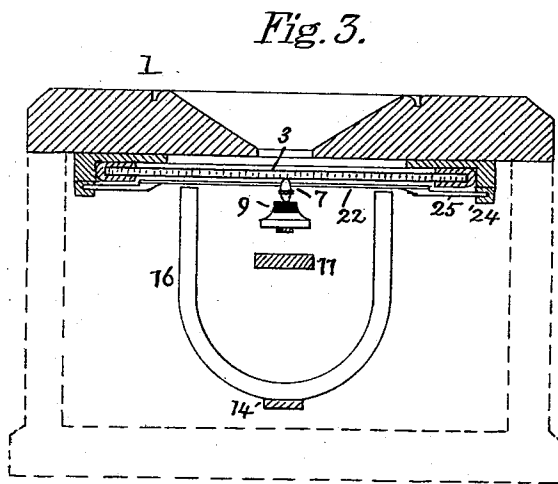
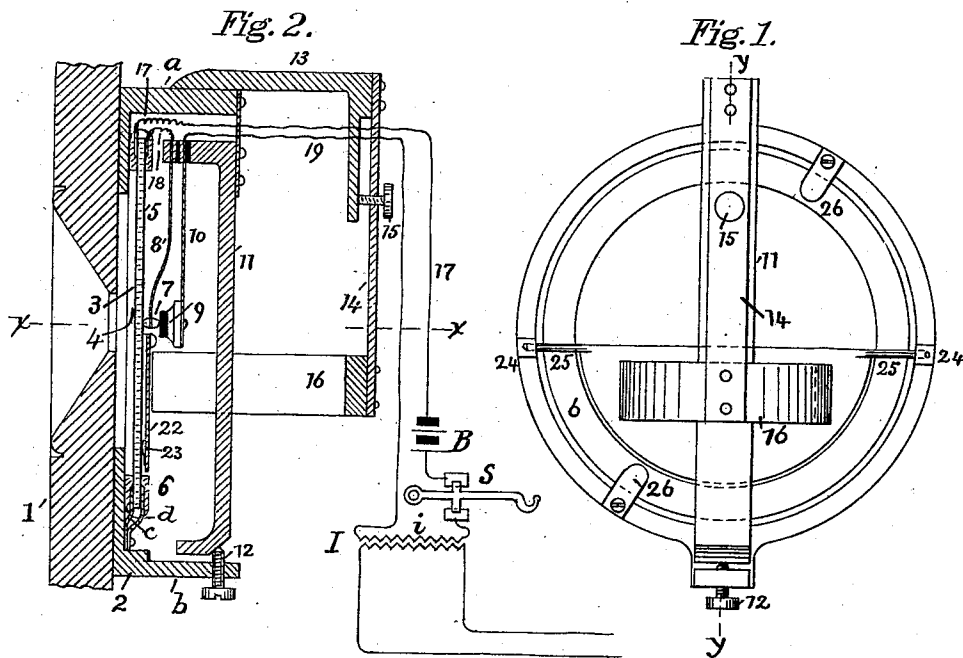


(No Model.)

H. S. PAGE.
TELEPHONE.

No. 513,720.

Patented Jan. 30, 1894.



Attest.
Frank Davis
A. D. Harrison.

Fig. 4.
Inventor:
H. S. Page,
by
Wm. Brown Crossley
Att'y.

UNITED STATES PATENT OFFICE.

HERBERT S. PAGE, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR OF FIVE-SIXTHS TO JOHN K. WHITING, OF SAME PLACE, AND HARVEY A. HOPKINS, OF WELLINGTON, MASSACHUSETTS.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 513,720, dated January 30, 1894.

Application filed May 15, 1893. Serial No. 474,190. (No model.)

To all whom it may concern:

Be it known that I, HERBERT S. PAGE, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Microphonic Telephone-Transmitters, of which the following is a specification.

My invention relates to microphonic telephone transmitters of that class which employ a diaphragm to receive the air vibrations produced by the voice and transmit the same to the electrodes, which are included in the primary of an inductive coil with a battery, or which are placed directly in the line circuit. In such transmitters, of which the well known Blake instrument is the type, unless the electrodes are very finely adjusted, they "break" or separate under the violent vibrations produced in loud speaking, and consequently fail to transmit the words spoken; and owing to there being practically but two points of contact between the electrodes, it is impossible to employ but a small amount of battery, and consequently the voice cannot be transmitted to as great a distance, as it is desirable under all circumstances, and when "breaks" occur between the electrodes sparks are produced which make slight holes in or roughening of the carbon surface and cause imperfect contact. It is well known that instruments of this type produce very clear and beautiful articulation in the receiving telephone, and it is desirable in view of this fact to employ this form in long distance talking if possible, and to this end my invention tends.

My invention consists therefore in providing means associated with a microphonic telephone transmitter of the Blake type whereby it may be used in long distance talking in which the disagreeable annoyances caused by "breaks" at the electrodes are obviated. The said means consist essentially of a diaphragm of glass, porcelain or other similar non-conducting material the outer face of which is carbonized, and the inner face of which is platinized. The two electrodes press against each other by means of a spring or by gravity, and one of them presses upon the inner or platinized face of the diaphragm.

The circuit is formed through the carbonized surface of the diaphragm around to its platinized surface, where two paths are provided for it, one through the two electrodes, and another through the spring or support of and to the first electrode, and then to the second electrode. In the rear of this diaphragm is pivoted a thin iron diaphragm, near the surface of which are located the poles of a horse shoe permanent magnet; this diaphragm is kept away from the platinized surface of the glass diaphragm by means of a light spring. A magnetic circuit is formed from the poles of the magnet through the iron diaphragm; and as the poles are placed very near the iron diaphragm, which is also very near the platinized surface of the glass diaphragm, the said surface also is affected and becomes a part of the said magnetic circuit, the result being that the said iron diaphragm acts as a damper upon the vibrations of the glass diaphragm, and at the same time modifies the current flowing across the platinized surface. The effect of this arrangement is, that with the same amount of battery as is used in any ordinary transmitter of the type referred to, speech can be transmitted to a longer distance.

I will now proceed to describe my invention in detail, and to point out the same in the appended claims.

Of the drawings—Figure 1 is a rear view of the operating parts of a telephone transmitter embodying my invention. Fig. 2 is a section on line *y y* of Fig. 1, showing the mouth piece of the instrument. Fig. 3 is a section on line *x x* of Fig. 2, showing the mouth piece, and the inclosing box in dotted lines.

I have shown my invention as embodied in the Blake type of microphonic telephone transmitters, but it can be associated with all the forms of transmitters that I am acquainted with.

1 indicates the front of the instrument provided with a mouth piece and resonating chamber.

2 is the iron plate which supports the diaphragm and which is provided with an arm *a* which supports the bar 11 which carries the

electrodes 7 and 9 by means of their metal springs 8 and 10; and the arm *b* which carries the adjusting screw 12, all in a well known manner.

3 represents a diaphragm of glass, porcelain, or of any other insulating material which is capable of acting as a vibrator; it has upon its periphery a rubber ring or cushion 6; the diaphragm is held to the iron frame 2 by means of metal clips 26, which press upon the rubber ring 6. The outer or front face 4 of the diaphragm is covered with carbon, applied in any suitable manner, as for instance, a mixture may be prepared of powdered carbon, with muriatic or sulphuric acid to which is added shellac, which is then put on the surface of the glass by means of a brush. The inner face of the diaphragm is platinized in any suitable way.

Fig. 2 shows the circuit connections when the transmitter is used with the primary *i* of an inductive coil I; starting from the battery B, it extends by conductor 17 to one edge of the carbonized surface of the diaphragm, thence across its surface to the metal springs *c* and *d* to the inner or rear platinized face of the diaphragm, and across it to the platinum electrode 7, or through a shunt path by wire 18 to the platinum electrode 7 and carbon electrode 9, supporting springs 10, conductor 19, primary *i* of inductive coil I through the switch *s* (when the telephone is removed from its hook) to the opposite pole of the battery B. This circuit is opened by the switch *s* when the telephone is upon the hook in the usual manner. I find that beneficial results follow from the employment of the diaphragm so constructed, the conducting surfaces of which form a part of the circuit. The carbonized and platinized surfaces 4 and 5 assist the electrodes 7 and 9 in varying the battery current of the local circuit, for as the diaphragm vibrates under the force of air vibrations produced by the voice, the surfaces contract and expand respectively and thus decrease and increase or vary the current, the electrodes meanwhile simultaneously performing the same functions. I find that there is less liability of the electrodes separating or breaking under loud sounds, and more battery can be placed in circuit, and a greater relative effect produced by the usual amount of battery. 13 is an extension of the arm *a* and has secured to it a depending lever 14 to the lower end of which is fastened a permanent magnet 16. By means of the screw 15 the poles of the magnet may be adjusted closely to the surface of a soft-iron diaphragm 22, shown as of semi-circular form, and hung by two arms 25, in bearings 24. The diaphragm 22 is hung very near to the platinized face 5 of the diaphragm 3 and its lower edge is prevented from touching it by the flat spring 23. By means of the magnet 16 and the diaphragm 22, a constant magnetic circuit is established through the latter, and by the proximity of the iron diaphragm to the platinized surface 5, the latter is at all

times made a part of the said magnetic circuit, which serves as a damper to the undue vibrations of the diaphragm 3, and to some extent the said magnetic circuit affects the voltaic circuit flowing across the said platinized surface when it forms a part of the primary circuit, as described.

In Fig. 4 I have shown a substitute for the solid carbon electrode 9—a mass of powdered carbon *m* inclosed in a silk case, which is pressed against the platinum electrode 7 as is usual with the solid electrode.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all the modes of its use, it is declared that what is claimed is—

1. In a microphonic telephone transmitter, the combination of a diaphragm of glass, or other insulating material, the outer surface of which is carbonized and the inner surface of which is platinized; of two electrodes in contact suspended by suitable conducting supports, one of said electrodes being in contact with said platinized surface, all included in a battery circuit, substantially as described.

2. In a microphonic telephone transmitter, the combination of a diaphragm of insulating material as glass, having its outer surface carbonized and its inner surface platinized, the two surfaces being connected to each other; of two electrodes in contact, suspended by suitable conducting supports, one of the said electrodes being also in contact with said platinized surface, and also connected thereto through its support, all included in a battery circuit, substantially as described.

3. In a microphonic telephone transmitter, the combination of a diaphragm of insulating material as glass, the outer surface of which is carbonized and the inner surface of which is platinized, the two surfaces being connected; of two suitably supported electrodes in contact, one of said electrodes being also in contact with said platinized surface, all included in a battery circuit, as described; and an iron diaphragm hung as described near the platinized surface of said diaphragm, and a permanent magnet having its pole or poles near said iron diaphragm, as and for the purpose described.

4. In a microphonic telephone transmitter, the combination of a diaphragm of insulating material as glass provided with a rubber ring and held in a suitable frame, the outer surface of which is carbonized and the inner surface of which is platinized, the two surfaces being connected; of two electrodes in contact suspended by conducting supports and provided with means of adjustment, one of the said electrodes being also in contact with said platinized surface, all included in a battery circuit, as described.

5. In a microphonic telephone transmitter, the combination of a diaphragm of insulating material as glass, provided with a rubber ring

and held in a suitable frame, the outer surface of which is carbonized and the inner surface of which is platinized, the two surfaces being connected; of two electrodes in contact
5 suspended by conducting supports and provided with means of adjustment, one of the said electrodes being also in contact with said platinized surface, all included in a battery circuit, as described; of an iron diaphragm
10 hung as described near the platinized surface of said diaphragm, and a permanent magnet

provided with means of adjustment, having its poles near said iron diaphragm, as and for the purpose described.

In testimony whereof I have signed my
name to this specification, in the presence of
two subscribing witnesses, this 6th day of May,
A. D. 1893.

HERBERT S. PAGE.

Witnesses:

ARTHUR W. CROSSLEY,
F. PARKER DAVIS.