(No Model.)

C. E. ALLEN.

ELECTRIC TELEPHONE.

No. 319,048. Patented June 2, 1885.

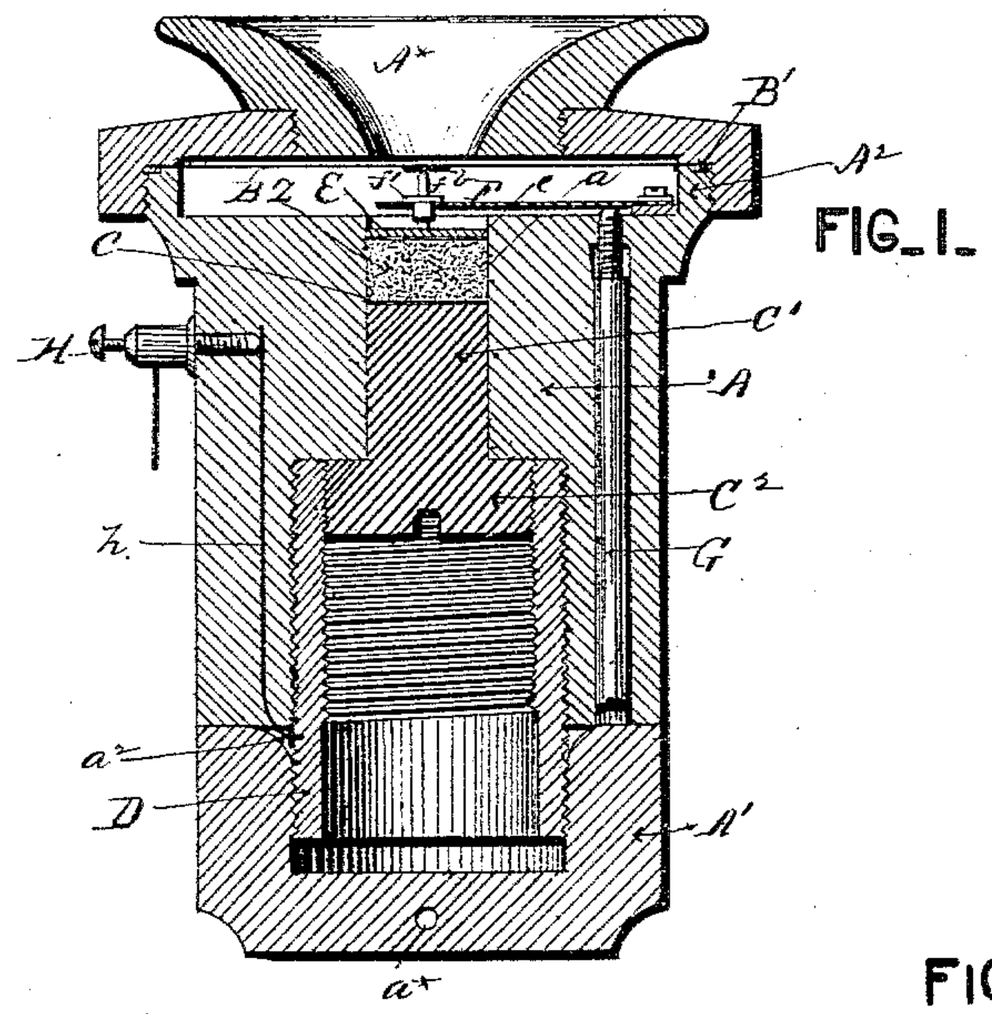


FIG_1.

FIG_4.

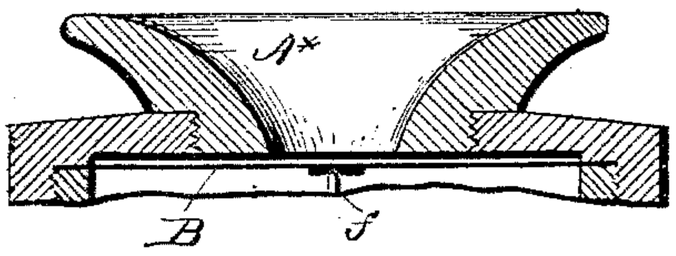


FIG_3.

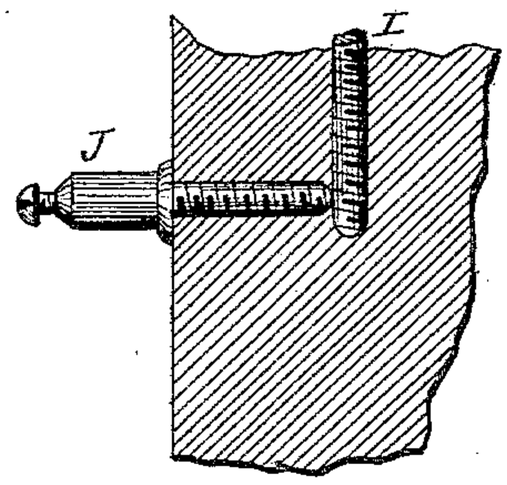


FIG_2.

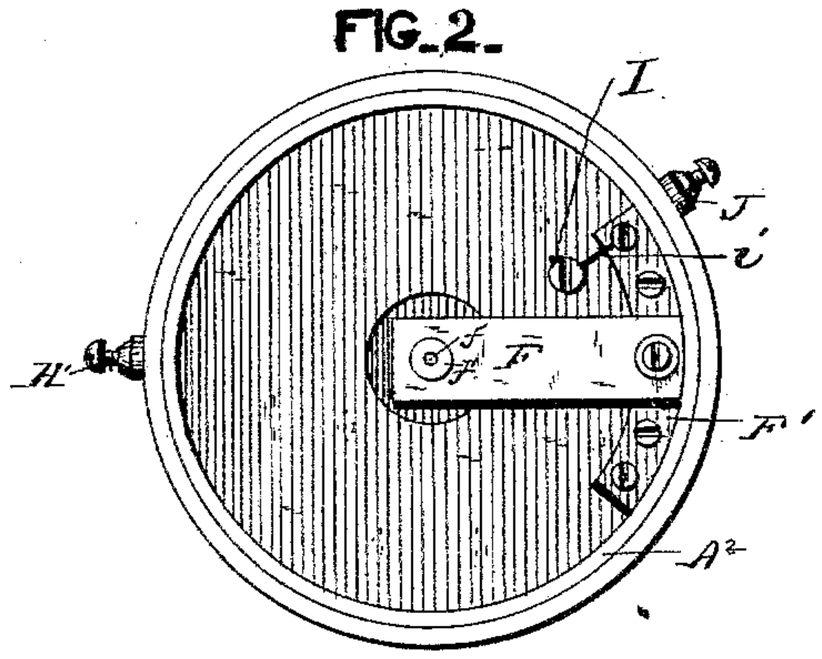
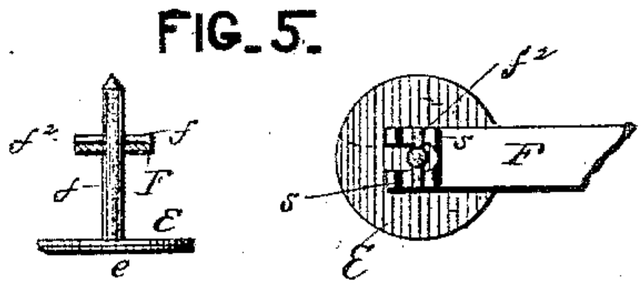


FIG_5.



WITNESSES
Wm. G. Gill.
George Melink

INVENTOR
Charles E. Allen
By D. N. Kalb
ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES E. ALLEN, OF ADAMS, MASSACHUSETTS.

ELECTRIC TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 319,048, dated June 2, 1885.

Application filed November 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. ALLEN, of Adams, Berkshire county, State of Massachusetts, have invented certain new and useful Improvements in Electric Telephones, of which the following is a specification.

My invention relates to electric telephones, and has for its object the provision of a simple and effective transmitter, which, when used, will produce upon an ordinary receiver of the Bell or any other type a very decided and marked increase in volume, intensity, and strength of tone, thus enabling me to transmit speech or other sounds over a long distance without increasing the battery-power. To produce this effect I employ as part of the electric circuit a body of conducting material in a loose free state—such as pulverized or powdered or granulated carbon. I place this material in a chamber with non-conducting side walls, and provide a platinum plate at bottom and another at top thereof. The bottom plate is fixed when in use, but is adjustable to increase or diminish the compactness of the free carbon or to enlarge or lessen the capacity of the carbon-chamber. The plate on the opposite end of the body of carbon is free to vibrate thereupon, and has a post for connection with the diaphragm. When the diaphragm is vibrated by the sound-waves, the vibrating platinum plate is moved correspondingly against the free carbon. This causes the conductivity of the pulverized mass to vary, and a consequent variance of the working strength of the current passing through the instrument in agreement with the sound-waves. A post or other part of the vibrating platinum plate or disk is held against the diaphragm by a delicately-adjusted spring, so as to cause it to respond to the slightest vibrations of the diaphragm and to quickly follow the outward movement of the diaphragm. The connection between the spring and the post or part of the platinum plate with which it makes contact is platinum-covered, so as to make it sensitive to electric contact, and although the pressure of the spring against the post is continuous, yet this pressure varies in unison with the vibrations of the diaphragm, and aids in varying the working strength of the current.

The accompanying drawings illustrate what I consider the best means for carrying my invention into practice.

Figure 1 is a central longitudinal section of my improved device. Fig. 2 is a plan view with the mouth-piece and diaphragm removed. Fig. 3 is a detail showing the connection to one of the line-posts. Fig. 4 is a section of a mouth-piece and diaphragm, in which the ring used upon the diaphragm in Fig. 1 is omitted. Fig. 5 shows in detail a modified form of connection between the spring and contact-post.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A is a cylindrical body formed of hard rubber or other insulating material. This body is provided with a central longitudinal opening and a top recess, in which the diaphragm vibrates. The mouth-piece A* is secured upon the top of the body A, and the diaphragm B is held in place between the mouth-piece and the body, as will be more fully explained hereinafter.

The longitudinal central opening in the body A forms a carbon-chamber, *a*, and also affords a means for securing the lower platinum plate or disk, C. This plate or layer C of platinum is secured upon the top of a metallic plug, C′, which fits snugly in the central opening, and with the platinum plate upon it forms the base of the carbon-chamber. An enlarged head, C², upon the bottom of the plug C′ (by means of which head the plug is operated by a screw-driver or any suitable tool) is screw-threaded on its periphery, as shown, and engages with internal screw-threads in a metallic cylinder, D, which is also screw-threaded exteriorly and engaged with threads on the interior of the enlarged lower part of the central opening in the body A. The insertion of this sleeve D enables me to make the threads on the head of the adjusting-plug very fine.

Above the plate C in the chamber *a* is placed the conducting material Z, which is powdered or pulverized carbon or similar low conductor in a loose free state. By properly adjusting the plug C′ this chamber *a* may be made smaller or larger and the carbon be more or less compressed.

Above the mass of powdered carbon Z is placed the disk E, having the platinum plate *e* fastened on its under side for contact with the carbon. The disk E is connected to a post, *f*, which has a point on its top, bearing against a button, *b*, loose or fixed on the under side of the diaphragm. A spring, F, secured at the outer end directly or indirectly to the body A, rests under a shoulder, *f'*, on the post *f*, and keeps it pressed against the diaphragm and throws the plate E away from the mass of powdered carbon. The opening in the spring-plate F through which the post *f* passes is large enough to allow free motion.

In order to regulate the tension of spring F, a set-screw, G, let through the body A and operated from below, the same as the plug C^2 C', bears under the plate or spring F between its two ends. By means of this screw the tension of spring F under shoulder *f'* is increased or diminished to produce the desired pressure of post *f* against the diaphragm; also, to increase or diminish the promptness with which the platinum plate E will follow the diaphragm in its outward movement and aid in regulating the compression or tension of the powdered or granulated carbon attendant upon the movement of the disk E in harmony with the vibrations of the diaphragm.

In order to protect the parts and make the instrument less liable to disorder and accidental change of adjustment, I provide a cap, A', of insulating material, which fits upon the lower end of the body A and covers and protects the otherwise exposed parts. This cap A' is held in place by being screwed upon the extended screw-threaded end of the sleeve D, which projects beyond body A for this purpose.

A diametrical opening, *a**, is formed in the cap A', for the insertion of a bar or rod to aid in unscrewing said cap in case it gets stuck. The upper interior corner of the cap A' is cut away or beveled, as shown at a^2, to admit of easy attachment of the connections to line without danger of breaking said connection by unscrewing or replacing the cap.

For security the outer end of spring F is secured upon an arc of metal, F', which is fastened to the rubber body A. The top of body A has an annular ridge or rim, A^2, as shown in Fig. 1, and the diaphragm B is provided with a ring, B', on its under edge, which ring fits over the rim A^2 and centers the diaphragm upon the instrument, insuring the proper connection between the point of the post *f* and the button on the diaphragm. This rim A^2 and ring B^2 may, however, be dispensed with, and the simple construction shown in Fig. 4 employed.

The form and connection between spring F and post *f* may be varied. As shown in Fig. 5, two pins, f^2, may be used in place of collar *f'*, and the hole in plate or spring F may be opened entirely to the end, making a slot, as shown. Stops *s s* may be provided upon the spring to prevent the post from turning too far around. Whether formed with the collar and closed hole, as shown in Fig. 1, or with the pins and open hole, as shown in Fig. 5, the points where the post and spring touch each other are covered with platinum, for the purpose of aiding the variance of the working strength of the current, as before explained.

The circuit through the instrument is as follows: From line-post H, through wire *h*, sleeve D, plug C^2 C' C, pulverized carbon Z, disk *e* E, post *f*, spring F, arc F', connection *i*, screw I, to line-post J. This circuit of course also includes the primary of an induction-coil, the secondary of which of course goes to line in the ordinary way.

Having thus described my invention, what I claim is—

1. The combination, with the diaphragm and a body or mass of conducting material in a loose or pulverized or granulated state, of a connecting-piece touching the diaphragm and the mass or body, and a spring to cause the connecting-piece to promptly follow the diaphragm and release its pressure upon the mass.

2. The combination, with the diaphragm, connecting or contact piece, and retracting-spring provided with an adjusting-screw, of the mass or body of conducting material in a loose or pulverized or granulated state.

3. The combination, with the mass of pulverized or granulated conducting material, vibrating platinum plate provided with a post for connection with the diaphragm, and a spring for throwing the platinum plate away from the mass, said post and spring being provided with platinum-covered portions where they touch each other to aid in varying the working strength of the current, as set forth.

4. The combination, with the diaphragm, contact-piece, and retracting-spring, of the mass of pulverized or granulated conducting material, the adjusting-plug C^2 C', provided with the platinum top, a diaphragm, and resistance devices, as set forth, and the threaded metal sleeve D, as set forth.

5. A case for transmitters, consisting of the body A, having the longitudinal central opening, with the screw-threaded sleeve D, extending beyond the end of the body, and the cap A', for screwing upon the sleeve and covering the parts.

6. The combination, with the diaphragm of a transmitter, of metallic electrode contact-pieces making electrical contact with each other independent of the diaphragm contact, as those formed by the end of the spring and pin on the post, and a carbon electrode, as set forth.

In testimony whereof I hereunto set my hand and seal.

CHARLES E. ALLEN. [L. S.]

In presence of—
JAMES H. SMITH,
I. N. KALB.