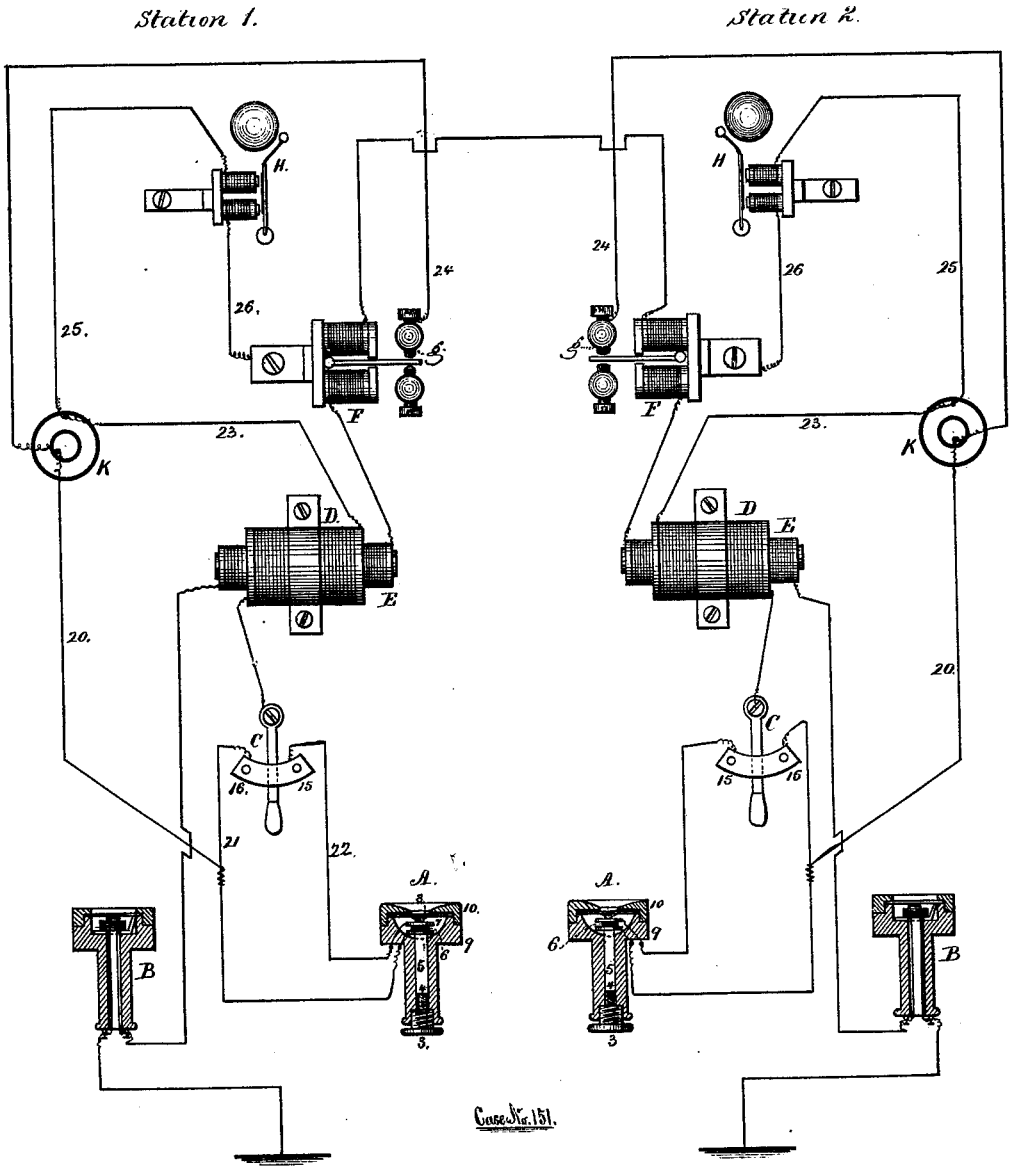
T. A. EDISON.

Speaking-Telephone.

No. 203,016. Patented April 30, 1878.



Witnesses

Chas. H. Smith

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y.

IMPROVEMENT IN SPEAKING-TELEPHONES.

Specification forming part of Letters Patent No. **203,016**, dated April 30, 1878; application filed March 7, 1878.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented an Improvement in Acoustic Telegraphs, (Case No. 151,) of which the following is a specification:

The object of this invention is to transmit and receive oral communications over telegraphic wire by sound.

The invention relates to an arrangement of devices for transmitting two classes of signals—one by the vibrations of the voice and the other by a key or switch for signaling the distant station.

In my application No. 141 for Letters Patent, filed July 20, 1877, I have shown a carbon disk acted upon by the vibrations of a diaphragm to produce rise and fall of electric tension upon the line, such carbon disk being in the main-line circuit; and in my application No. 146, filed December 13, 1877, I have shown a rheostatic device acted upon by the diaphragm to produce rise and fall of tension in the primary circuit of an induction-coil.

I find that the carbon heretofore employed in connection with a diaphragm is not adapted to use in the primary circuit of an induction-coil, because its resistance is too great, and the necessary rise and fall of tension is not produced.

If the carbon is mixed with other substances, so as to separate the particles, the rise and fall of tension can be obtained; but its resistance is too great to be used in the primary circuit of an induction-coil.

I have discovered that lamp-black obtained from the combustion of very light hydrocarbons, such as gasoline or naphtha, can be used for the aforesaid purpose.

I select from lamp-black thus made only the very blackest portions, and then place the same in a mold, and subject it to a very powerful pressure, sufficient to consolidate the same, and place it in a correspondingly-shaped cavity contiguous to the diaphragm, with a piece of cork or a piece of rubber intervening between the same and the diaphragm, and connect the disks of platina foil that are used at each side of the carbon in the primary circuit of the induction-coil, and obtain from the pressure resulting from the motion of the diaphragm the necessary rise and fall of tension without the great resistance heretofore inseparable from the carbon in said circuit.

I will now describe the action of the apparatus.

A at station 1 is the carbon-transmitter. 9 is the body of the telephone. 10 is the cap for securing the diaphragm tightly. 8 is a piece of cork and rubber tube secured to the diaphragm. The rubber tube rests, when properly adjusted for speaking, against an ivory disk, 7. The ivory disk rests upon a disk of platina foil resting upon a button of lamp-black carbon, 6. This, in its turn, rests upon the platinized surface of the rod 5, which is adjustable to and from the diaphragm by the right and left hand screws 3 and 4.

The platina on the top of the carbon disks next to the diaphragm is connected to a binding-post, and to the other binding-post a wire connects with the rod 5. Thus the circuit must first pass to the upper platina and through the carbon to the lower plate.

The vibrations of the diaphragm subject the carbon to different pressures, according to the amplitude of motion resulting from the sound-waves, and this difference of pressure varies the resistance offered by the carbon to the passage of the current, and produces a rise and fall of electric tension.

The instrument A is included within the primary circuit of the induction-coil D E. D is the primary wire of the coil, and is wound on the outside of the secondary coil E. C is a switch, which, when moved to the right in contact with 15, places the transmitter A in the primary circuit containing the battery K and coil D. When the switch is in the center, the primary circuit is open and the apparatus is ready for the reception of a call-signal. When the switch is turned to the left, at 16, the instrument A is thrown out of circuit, and the battery only is connected to the primary coil D.

The movement of the switch from 16 several times serves to open and close the primary circuit and throw a powerful induced current into E, and then to the line.

The polarized relay F, coil E, and receiving-

instrument B are all placed in the main-line wire at both stations. The powerful current thrown into the secondary coil and line by the movement of the switch C from 16 works the tongues of both polarized relays F in unison with the switch. The tongues, closing against their contact-points, close a local circuit containing a call-bell, H.

The same battery K that is employed with the telephones is utilized to ring the bell. The connections for the transmitter A are from the battery K, by wire 20, to 21, then through the telephone A to wire 22, and from 22 to 15, through the switch-lever C, to the primary coil D and to wire 23, back to battery. This is the connection for transmitting and receiving telephonically. When not thus working, the switch C is placed in the central position between 15 and 16. When in this position, if the switch of the distant station is moved to operate the call, the tongue of F closes the local circuit at *g;* thence, by wire 24, to battery K, and through K to wire 25; thence through the magnets of the bell-call to wire 26, and then through the tongue of the polarized relay.

When the switch C is moved to work the distant call it is brought into contact with 16, and the current passes from K, by wire 20, to 16; thence through C to the primary wire D; thence to 23, back to the battery K, setting up a powerful induced current in the coil E and line.

I will mention that it is not necessary to use a polarized relay, as an unpolarized relay of the ordinary character may be used, as the current due to the opening of the primary circuit is much the strongest; but the lever of the unpolarized relay should be light and the spool very short. It is not even necessary to use the call-bell H in many instances, when the terminal is very quiet, as the sound given by the polarized relay itself is sufficient; or a small bell may be worked by the tongue.

The tongue of a polarized relay should be biased, so that it will always be away from the point *g*, except when moved by the signaling-currents, so as to prevent short-circuiting the battery K when transmitting telephonically.

By employing two cells and a considerable resistance in the magnets upon the call-bell, it is not essential to bias the tongue; but it may be made to respond to both positive and negative, a shunt from one cell being used to furnish current to the call-bell.

I claim as my invention—

1. The combination of transmitter A, coils D E, switch C, polarized relay F, bell H, battery K, and circuits, arranged and operating substantially as herein set forth.

2. In combination with a telephonic and the primary circuit of an induction-coil, the button of lamp-black carbon, prepared as set forth, and placed in the primary circuit, substantially as and for the purposes set forth.

Signed by me this 28th day of February, A. D. 1878.

THOS. A. EDISON.

Witnesses:
HAROLD SERRELL,
GEO. T. PINCKNEY.