

(No Model.)

S. TAINTER.
Telephone Transmitter.

No. 243,657.

Patented June 28, 1881.

Fig. 1.

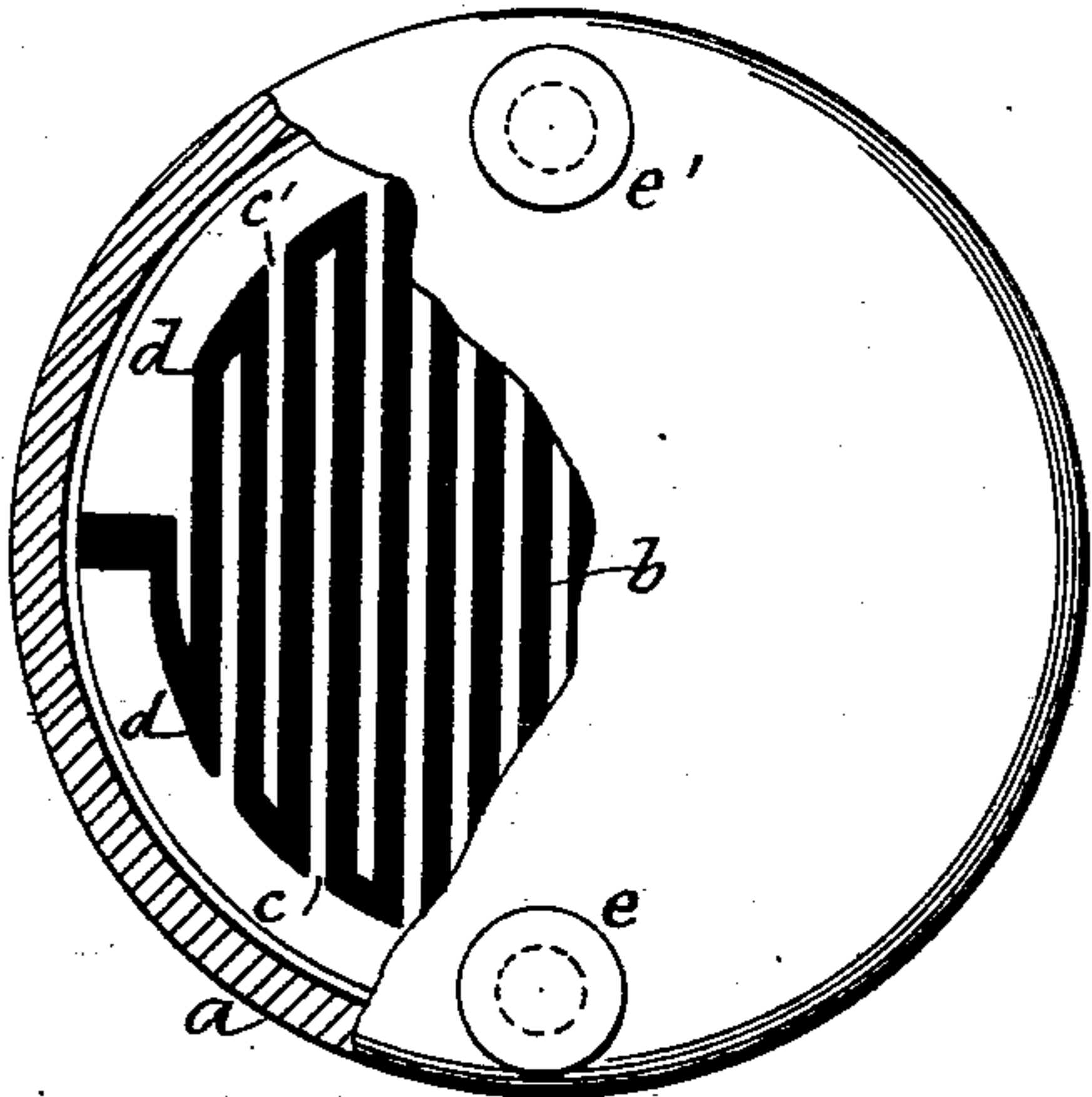


Fig. 2.

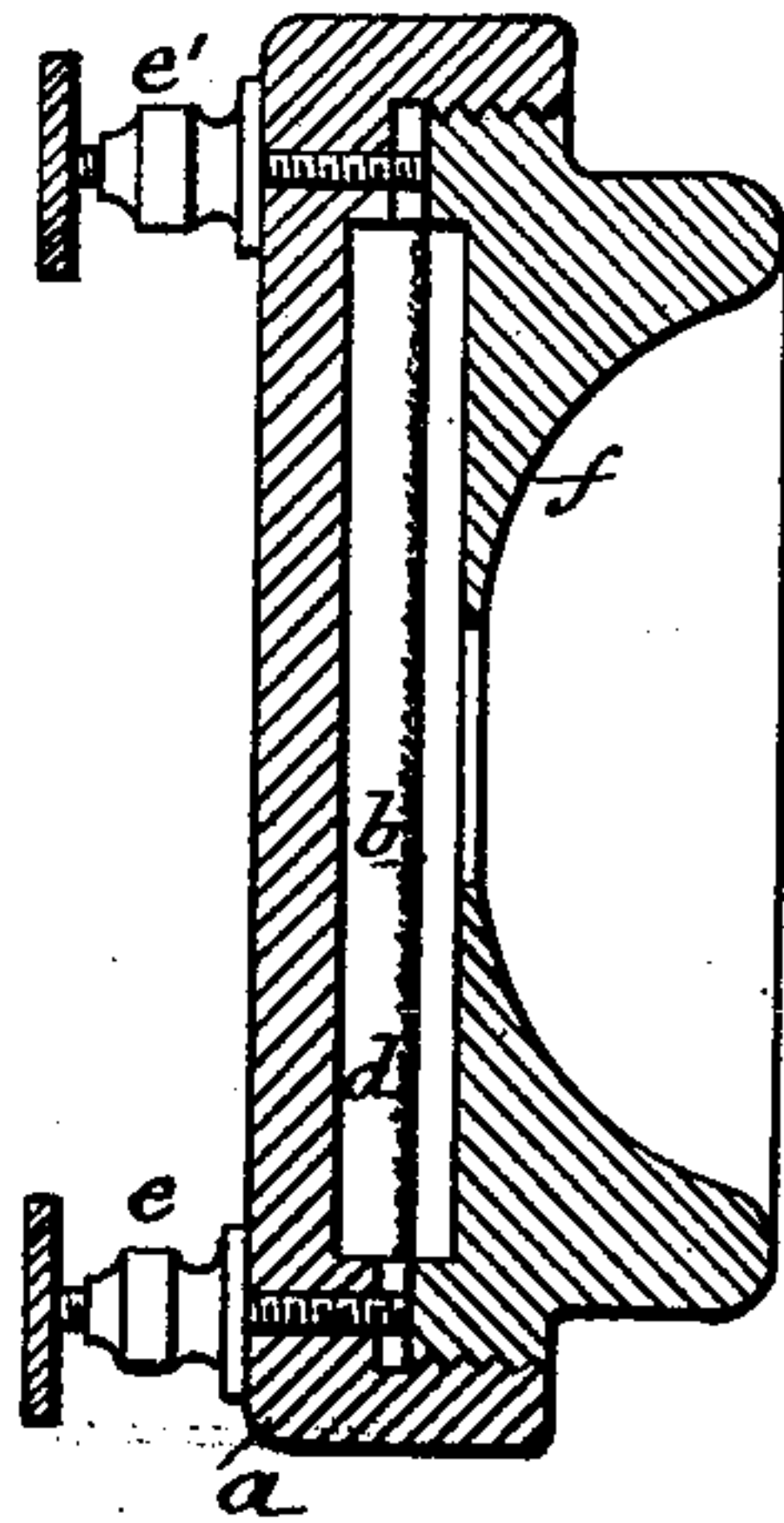


Fig. 3.

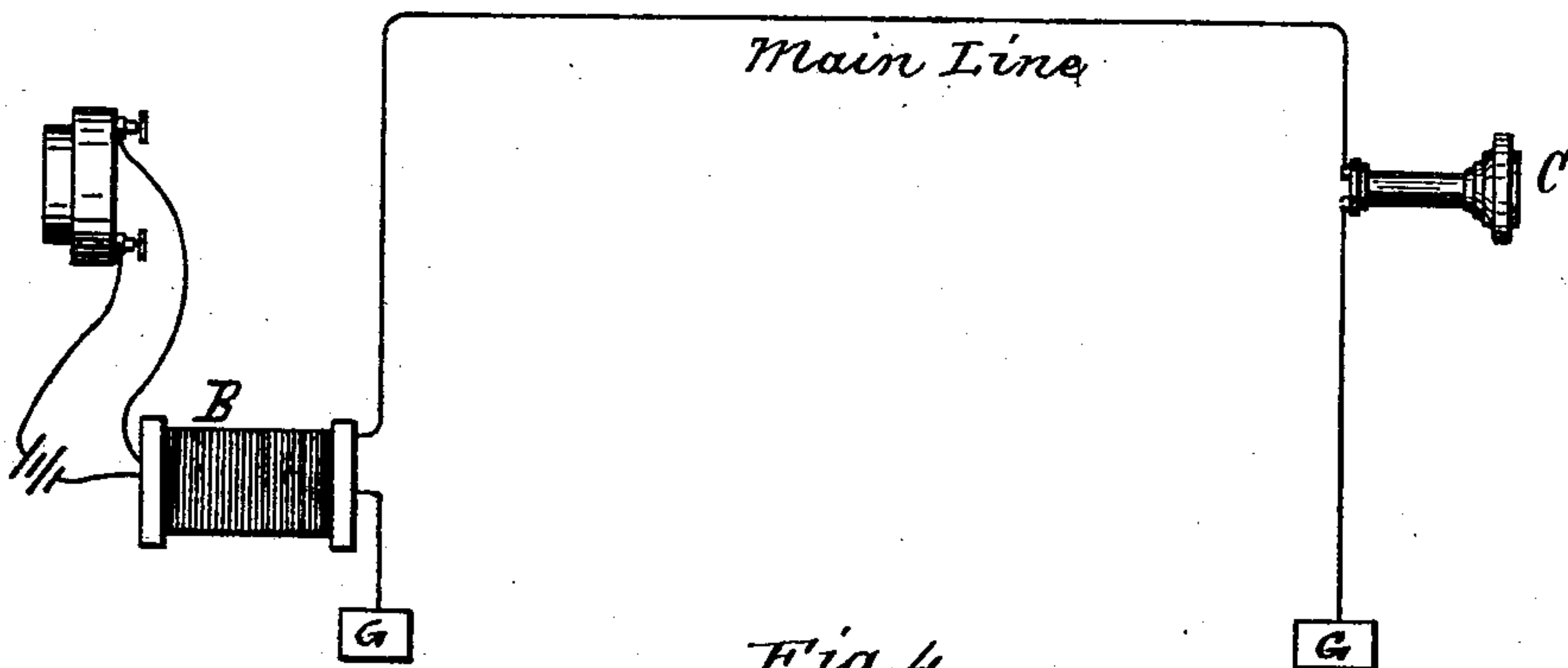
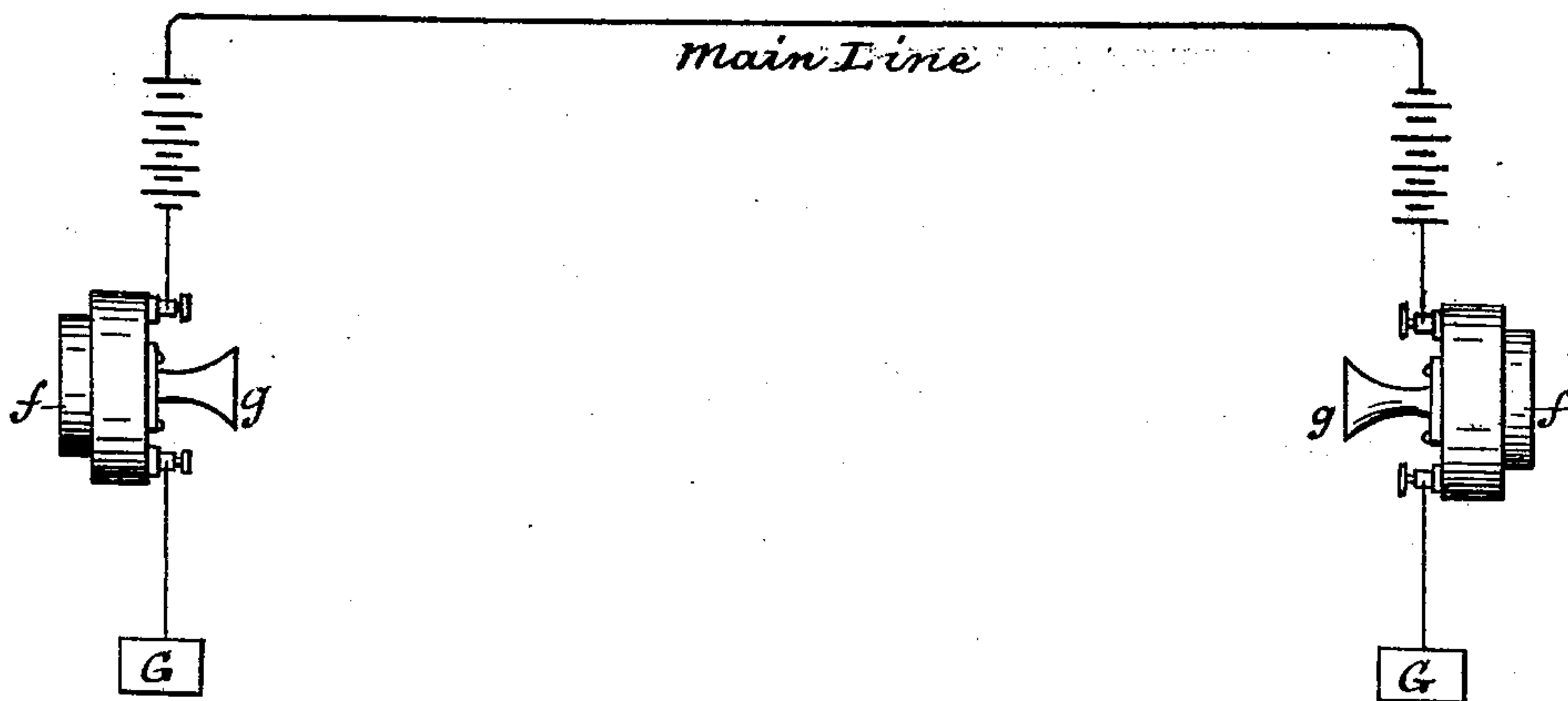


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

SUMNER TAINTER, OF WASHINGTON, DISTRICT OF COLUMBIA.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 243,657, dated June 28, 1881.

Application filed May 14, 1881. (No model.)

To all whom it may concern:

Be it known that I, SUMNER TAINTER, residing in Washington, District of Columbia, have invented a new and useful Improvement in Telephone-Transmitters, which invention is fully set forth in the following specification.

This invention relates to telephonic transmitters for varying the resistance of an electric circuit by the action of sound-waves, so as to produce in the current on said circuit vibrations or undulations corresponding to said sound-waves.

The improved transmitter consists of a vibratory plate or diaphragm of insulating material and a layer of conducting-particles supported upon the surface of said plate or diaphragm and included in circuit with a battery or other suitable source of electricity. The sound-waves act upon the plate or diaphragm and impress upon it vibrations similar to their own. These vibrations cause disturbance in the layer of conducting-particles, so that the latter are at one time crowded together and at another moved apart, and their resistance to the electric current correspondingly diminished and increased.

The conductors which form the poles of the electric circuit, and between which the conducting-particles are placed, are preferably thin metallic strips, sheets, or films, fastened to the surface of the diaphragm or vibratory plate, so as to partake of its vibration. Such strips do not interfere with the freedom of vibration. In order to diminish the normal resistance of the instrument, the conductors are brought close together, so as to leave but a narrow channel between them, and they are so constructed and arranged as to distribute the current over a considerable area. By diminishing the width of the channel and increasing its length the resistance can be very greatly diminished; but it is obvious that there will be a certain point where the best effects, under given circumstances, will be produced, and this point will of course depend upon the size of the diaphragm and other conditions. A very advantageous shape for the conductors is that of a backing with spaced projections or teeth extending from one side, so as to form a sort of comb. By arranging the two conductors so that the projections or teeth of

one alternate with those of the other, a long channel for the conducting-particles, of suitable width, can be obtained on a comparatively small diaphragm. The diaphragm can be made of any vibratory insulating or non-conducting material. The conductors would ordinarily be of metal.

The materials of which it is preferred to make the diaphragm and conductors are, for the former a thin sheet of mica or glass, and for the latter a deposited film of silver, with a space or channel for the conducting-particles ruled or scraped therein by a suitable tool. A thin layer of lamp-black answers well as the layer of conducting-particles, especially when used in connection with the mica or glass diaphragm and silver-film conductors; but other conducting material, in a flocculent, pulverulent, or subdivided condition—or, in other words, in a similar physical condition to lamp-black—such as spongy platinum, silver, black oxide of manganese, and the like, can be employed instead.

In order to protect the conducting-particles from the action of the breath of the speaker, the mouth-piece is made to communicate with a chamber at the back of the diaphragm, or upon the side opposite from the conducting-particles.

In the transmitter described in Letters Patent No. 228,507, granted to A. G. Bell, June 8, 1880, the variations in the resistance of the circuit are effected by crowding together or forcing apart conducting-particles forming a part of said circuit; but in said instrument the particles are applied as a coating to an inflated ball of thin sheet-rubber, instead of being supported upon a vibratory plate or diaphragm, as in the present invention. The conductors forming the poles of the circuit are metallic pieces connected with the stationary uprights, and supporting between them the inflated ball which constitutes the vibrator, instead of being strips carried by the vibrator itself, and the electrical resistance is necessarily high and does not admit of regulation within the limits attainable with the improved instrument.

The following description will enable persons skilled in the art to which the invention relates to make and use the same, reference

being had to the accompanying drawings, which form a part of this specification.

Figure 1 is a front elevation, with the wall of the chamber or box partly cut away to expose the diaphragm. Fig. 2 is a cross-section, and Figs. 3 and 4 diagrams representing the transmitter connected in circuit.

The transmitter shown in Figs. 1 and 2 is composed of a case, *a*, in which the diaphragm or vibratory plate *b*, of thin mica or glass, of, say, one-hundredth of an inch in thickness, is secured.

The conductors *c c'* are formed of silver film, and the layer *d* of particles of lamp-black. Binding-posts *e e'* are connected with the conductors *c c'*. The speaking-tube or mouth-piece *f* leads to a chamber on the rear side of the diaphragm or vibratory plate. The conductors *c c'* are formed upon the mica or glass plate by depositing thereon a film of silver and then scraping or ruling the film with a flat-pointed instrument, so as to divide it into two parts, and leave between them a channel of the shape shown, or of other suitable form, and of substantially equal width. A more particular description of the manner in which this scraping or ruling may be performed is given in Letters Patent No. 241,909, granted to Alexander Graham Bell and myself on the 24th of May, 1881, for an improvement in photophonic receivers. The channel is preferably of equal width throughout, in order to make the resistance uniform, and thus distribute the current equally, as near as may be. The lamp-black can be deposited by smoking the silvered side of the mica or glass over the flame of a petroleum-lamp or other suitable flame. If spongy platinum or platinum-black be employed, it can be thrown down from a solution by well-known means.

The transmitter can be connected directly in the main line, or the connection can be made by means of an induction-coil. In Fig. 3 it is represented as placed with the battery in a local circuit of low resistance, which includes the primary circuit of the induction-coil B, the receiver C (shown as the ordinary hand magneto-telephone) being placed in the main line, which includes the secondary circuit of the induction-coil. The instrument described is capable of use as a receiver as well as a transmitter; but it should for that purpose be provided with an ear-tube or opening communicating with the chamber on the side of the diaphragm which supports the conducting-particles. In Fig. 4 it is shown provided with a hearing-tube, *g*, in addition to the mouth-piece *f*, and placed with its battery in the main line.

The transmitter placed in a local circuit, as in Fig. 3, could be also provided with a hear-

ing-tube and be used as a receiver, the hand-telephone shown being dispensed with.

As a receiver the instrument embodies the invention of Mr. Alexander Graham Bell, set forth in his Letters Patent for improvement in telephonic receivers, No. 241,184, dated May 10, 1881, the operation being independent of the vibratory character of the insulating-support.

It is obvious that various modifications may be made in the details of the instrument without departing from the spirit of the invention.

Instead of ruled silver film as the conductors, strips of metallic foil pasted upon the diaphragm could be used.

I claim—

1. The combination of a vibratory insulating plate or diaphragm, a layer of conducting-particles, and conductors, whereby said layer can be included in an electric circuit, substantially as described.

2. The combination, with a vibratory support, of insulating material of thin sheets, strips, or films of conducting material attached to said support, so as to partake of its vibration, and conducting-particles included in a channel between said sheets, strips, or films, substantially as described.

3. The combination, with a thin plate or diaphragm of mica, glass, or other insulating material, of conductors attached to said plate or diaphragm and conducting-particles included between said conductors, substantially as described.

4. A transmitting-instrument comprising the vibratory plate or diaphragm of insulating material, the conductors, the metallic particles on one side of said plate or diaphragm, between said conductors, and the speaking tube or opening arranged to allow sound-waves to fall on the opposite side of said plate or diaphragm, substantially as described.

5. The combination, with the vibratory insulating-support and conductors and conducting-particles on one side of said support, of a hearing tube or opening communicating with a chamber on the same side of the said support, and a speaking tube or opening arranged on the opposite side, substantially as described.

6. The combination of the thin mica or glass plate or diaphragm, the ruled silver film, and the layer of lamp-black or other conducting material in a similar physical condition, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SUMNER TAINTER.

Witnesses:

PHILIP MAURO,
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