

(No Model.)

2 Sheets—Sheet 1.

A. J. MACDONALD.

TELEPHONE.

No. 438,632.

Patented Oct. 21, 1890.

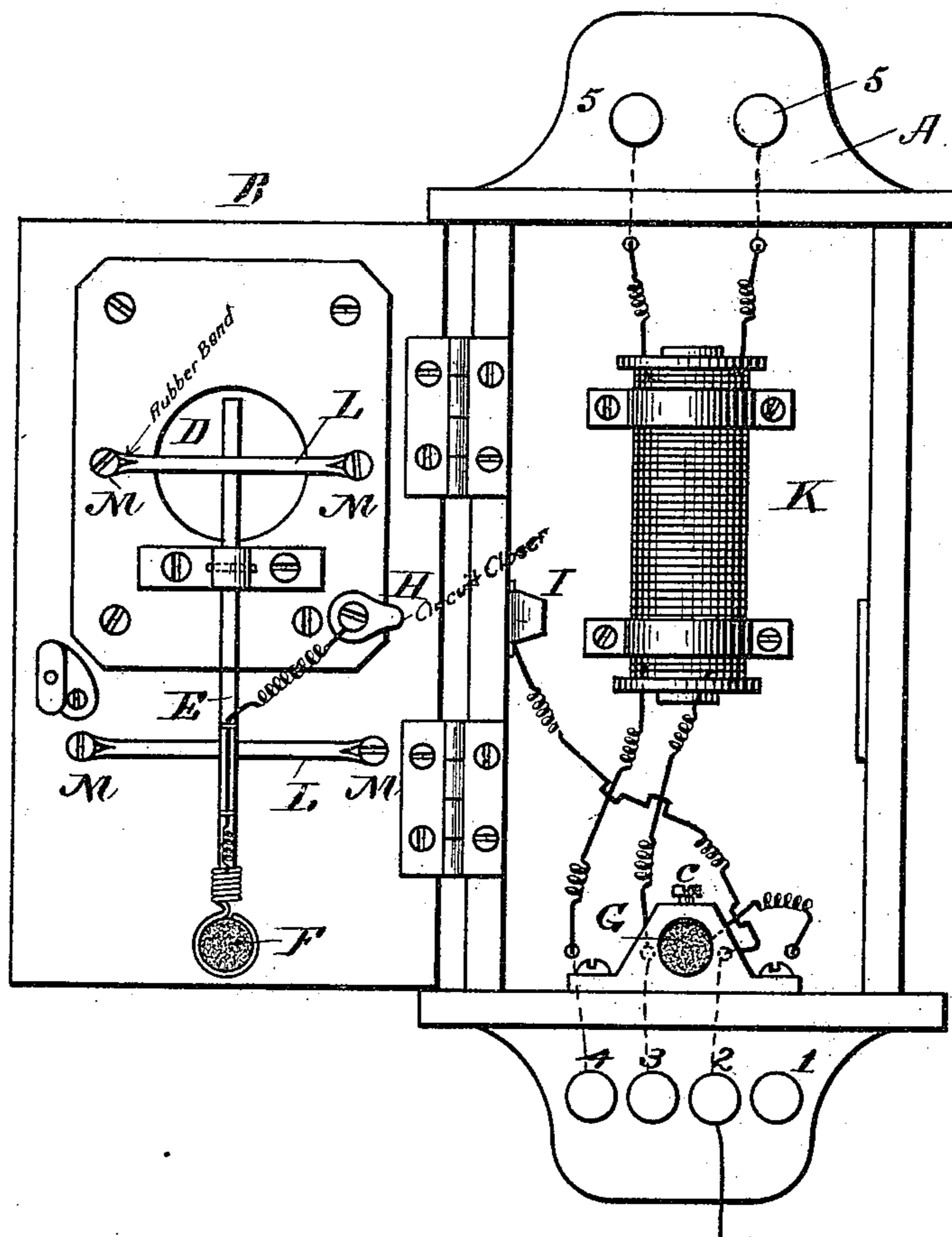


Fig. 1.

WITNESSES

Frank G. Parker
Matthew M. Blunt

INVENTOR.

Archibald MacDonald
by his attorney
Ally. L. Hays

(No Model.)

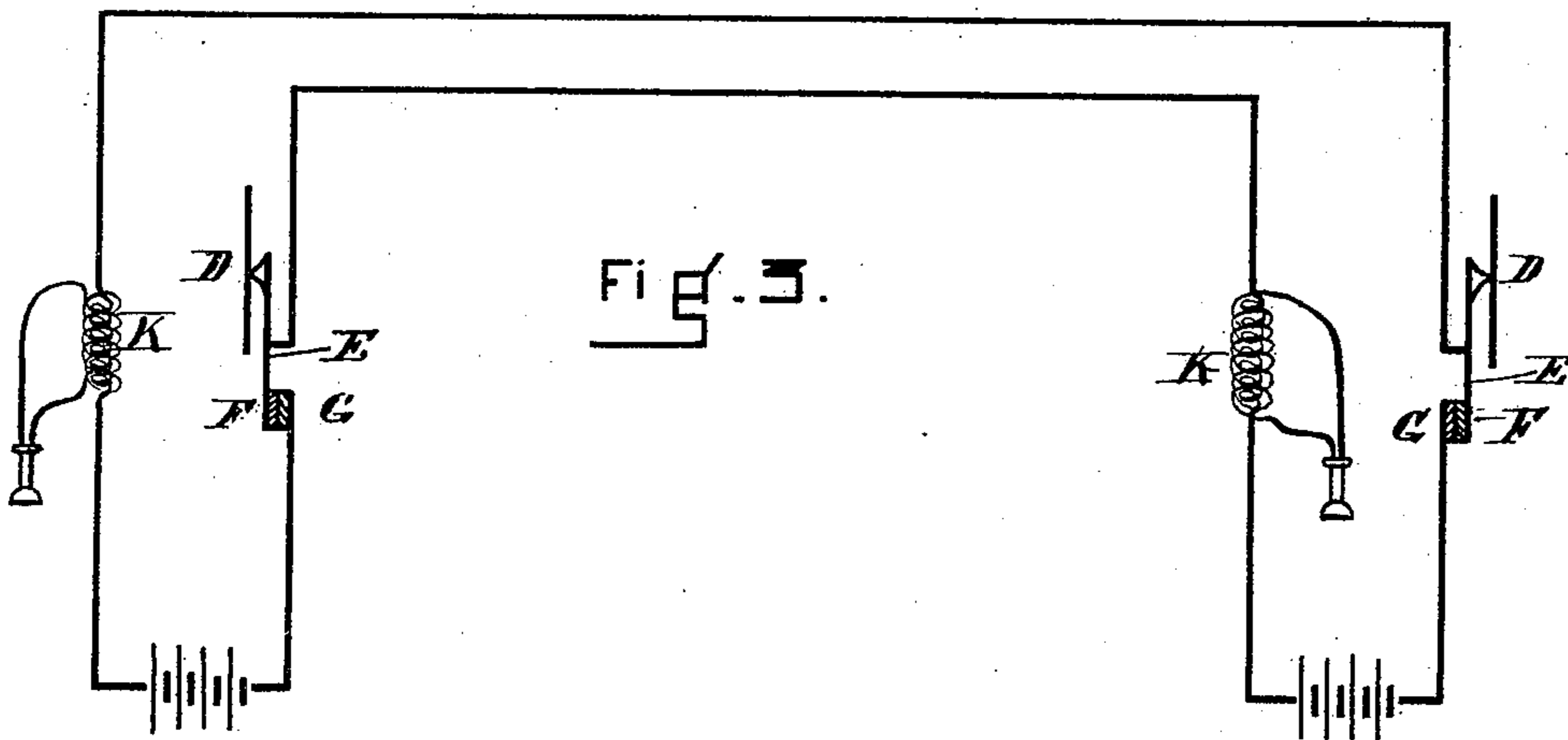
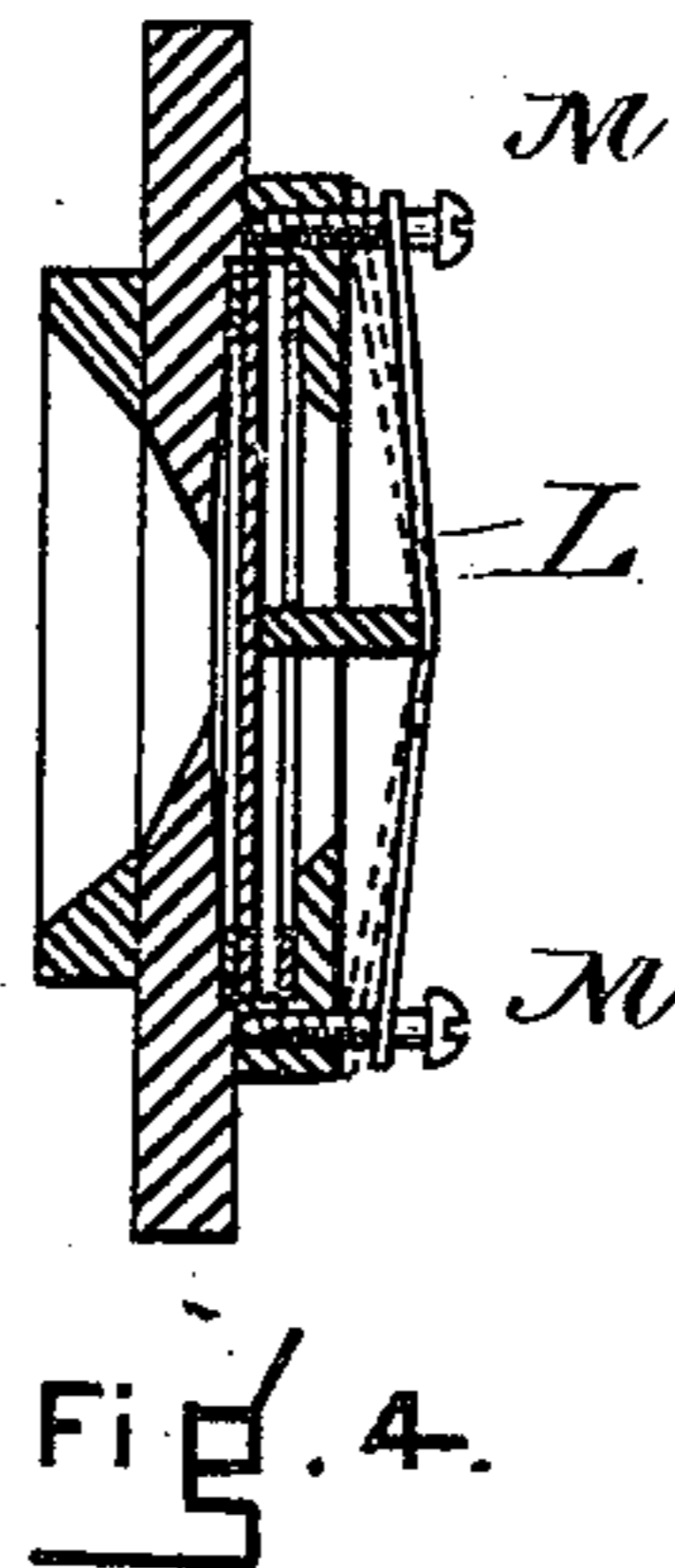
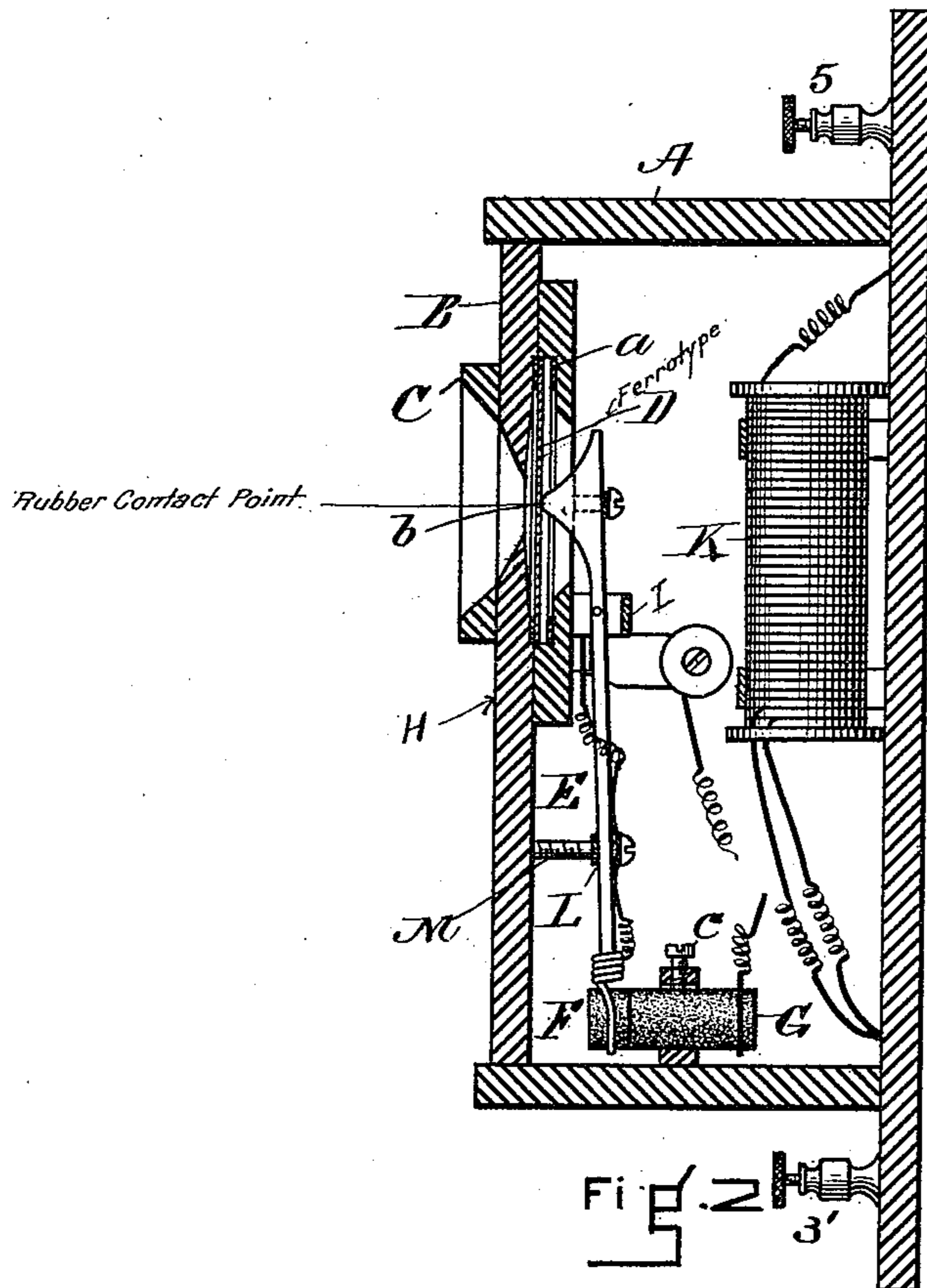
2 Sheets—Sheet 2.

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WITNESSES

Frank H. Parker
Matthew M. Blunt,

INVENTOR.

Archibald J. MacDonald
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Chas. L. Hayes

UNITED STATES PATENT OFFICE.

ARCHIBALD J. MACDONALD, OF NORTH TIVERTON, RHODE ISLAND, ASSIGNOR
TO HENRY E. TOWNSEND, TRUSTEE, OF BOSTON, MASSACHUSETTS.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 438,632, dated October 21, 1890.

Application filed December 12, 1889. Serial No. 333,410. (No model.)

To all whom it may concern:

Be it known that I, ARCHIBALD J. MACDONALD, of North Tiverton, in the county of Newport and State of Rhode Island, have invented
5 a new and useful Improvement in Telephone-Transmitters, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to that class of telephone-transmitters in which there are two opposing carbon surfaces in an electric circuit and in contact with one another; and the object of the invention is to amplify at the carbon surfaces the vibrations of the diaphragm.

15 To this end the invention consists in the combination, substantially as and for the purpose hereinafter set forth, with the diaphragm, of a lever pivoted at one end and having its shorter arm in contact with the back of the diaphragm and on its longer arm a piece of carbon forming part of an electric circuit, a piece of carbon with which the carbon on the arm of the lever makes contact and also forming part of an electric circuit, and means for
25 causing an adjustable pressure of one arm of the lever against the diaphragm, and of the other arm of the lever and of the carbon carried thereby against the other carbon.

The invention also consists in the combination, substantially as and for the purpose set forth, with the lever, of adjustable bands of elastic material bearing against the opposite arms of the lever and acting to produce an adjustable pressure of one arm of the lever
35 against the diaphragm and of the other arm against the carbon.

The accompanying drawings show a transmitter which embodies the principle of my invention.

40 The parts of the transmitter are supported in a suitable case of wood or other material, as is usual, and in the case is placed the induction-coil which is used with the transmitter. This induction-coil may be connected in the usual manner—that is, with the primary coil in circuit with the transmitter and the battery and the secondary coil connected to the line; but I prefer to connect it as described and claimed in another application for a pat-

ent of the United States, filed by me December 12, 1889, and having Serial No. 333,409—viz., with one terminal of the primary coil connected to one pole of the battery and the other terminal of the primary coil connected to the moving contact at the opposite station, and with the terminals of the secondary coil connected to the telephone-receiver at the station, the effect of this arrangement of connection being that the telephone at the receiving-station is affected by variations in the current in the secondary coil at the receiving-station, produced by variation in the current of the primary coil at the receiving-station, due to the action of the transmitter at the transmitting-station.

In the accompanying drawings, Figure 1 is a view of the instrument in elevation, showing the cover of the case thrown back. Fig. 2 is a vertical sectional view with the cover closed. Fig. 3 is a transverse sectional view on the line *xx*, Fig. 2, and Fig. 4 is a diagram of the connection.

In the several figures the same letters and figures refer to the same parts.

Referring to the drawings, A is a suitable box or case having a cover B hinged thereto. Upon the inside face of the cover is placed the amplifying-lever.

C is the usual mouth-piece upon the face of the cover, and D is the diaphragm of ferro-type under the mouth-piece. This diaphragm, instead of being fixed at its edges, as is the usual construction, moves loosely in a chamber behind the mouth-piece and bears against a rubber ring *a* in the chamber on each side of the diaphragm.

E is a lever, which is preferably made of wood or of any other light material, and is pivoted near one end on the back of the cover B. The shorter arm of this lever is in contact with the center of the diaphragm D and preferably makes an elastic contact with the diaphragm by means of a contact-point of rubber *b* on the lever. The other and longer arm of the lever carries a piece of hard carbon F, which makes contact with a piece of carbon G, supported on the case. The position of this carbon may be adjusted by means of a

set-screw c. The piece G is electrically connected to the binding-post I', connected to the positive pole of the battery.

On the cover is a metallic plate H, which is electrically connected to the carbon piece F, and which piece when the cover is closed makes contact with a metallic plate I in the case and is electrically connected to the binding-post 2. This binding-post is connected to the line. This connection is indicated on the diagram, which shows the two instruments connected in a metallic circuit.

It has not been considered necessary to show a diagram in which the earth forms part of the circuit, for the reason that the principle upon which the connections are made having been explained the arrangements when the earth forms part of the circuit will be obvious to the electrician.

K is the induction-coil, which is composed of primary and secondary wire, as is usual. The number of turns in these coils and the size of the wire of which they are made may be varied as may be found to give the best results; but it has been found that if the primary coil is composed of four layers of No. 24 insulated wire wound next the core and the secondary is composed of twelve layers of No. 36 insulated wire the transmission of articulation will be satisfactory. One of the terminals of the primary coil of the induction-coil is electrically connected to the binding-post 3, which is connected to the negative pole of the battery, and the other terminal of the primary coil is electrically connected to the binding-post 4, which is connected to the line, as shown in the diagram, if there is a metallic circuit, or to the earth if there is but one line-wire. The terminals of the secondary coil of the induction-coil are connected to the binding-post 5, to which the terminals of the telephone-receiver are connected.

The form of the carbon contacts and the manner of establishing their electrical connections may be varied as may be found convenient, and I do not confine myself to the form described and shown.

The lever E is represented as suspended in a vertical position; but the contact of the arms of the lever with the diaphragm and carbon G, respectively, is not caused by the weight of the lever, but is effected by the action of springs upon these arms, whereby an adjustable light contact is obtained, and the lever may be in a horizontal position, though a vertical position is preferable. By altering the tension of the springs the pressure at the contact-points can be varied, so that in connection with the loosely-supported diaphragm the vibration of this diaphragm

will act to make and break the circuit at the carbon surfaces or to vary the pressure between these surfaces without breaking the current. A form of spring which has been found to afford a delicate and adjustable pressure both at the contact of the lever with the diaphragm and at the carbon surfaces is that shown in the drawings. This consists of a band of soft rubber L, which is extended over the short arm of the lever E and under the long arm. These bands are stretched between pins M M, and the ends of the bands are capable of being raised or lowered on the pins, so as to cause the bands to exert a greater or less pressure on the arms of the lever to vary the pressure of the short arm against the diaphragm and of the carbon piece on the long arm of the lever against the fixed carbon piece. I do not confine myself to the use of these bands; but I can adopt any other spring device which will accomplish the same result.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is—

1. In a telephone-transmitter, the combination of a diaphragm, a lever pivoted near one end behind the diaphragm and making contact at its shorter arm with the back of the diaphragm, a fixed carbon block forming part of an electric circuit, a carbon piece elastically connected to the long arm of the lever and forming part of the electric circuit, and adjustable means, substantially as described, for effecting a pressure of the short arm of the lever against the diaphragm, as set forth.

2. In a telephone-transmitter, the combination of a diaphragm, a lever pivoted behind the diaphragm and having one of its arms in contact therewith, a fixed carbon block forming part of an electric circuit, and a carbon piece elastically attached to the other arm of the lever and in electric contact with the fixed carbon block, substantially as shown and described.

3. The combination, substantially as and for the purpose set forth, of the lever E, pivoted near one end, the adjustable rubber band L, bearing against the upper surface of the short arm of the lever, the rubber band L, bearing against the lower surface of the longer arm of the lever, and the pins M, passing through the ends of the rubber bands.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 1st day of October, A. D. 1889.

ARCHIBALD J. MACDONALD.

Witnesses:

ALEX. L. HAYES,
FRANK G. PARKER.