

(No Model.)

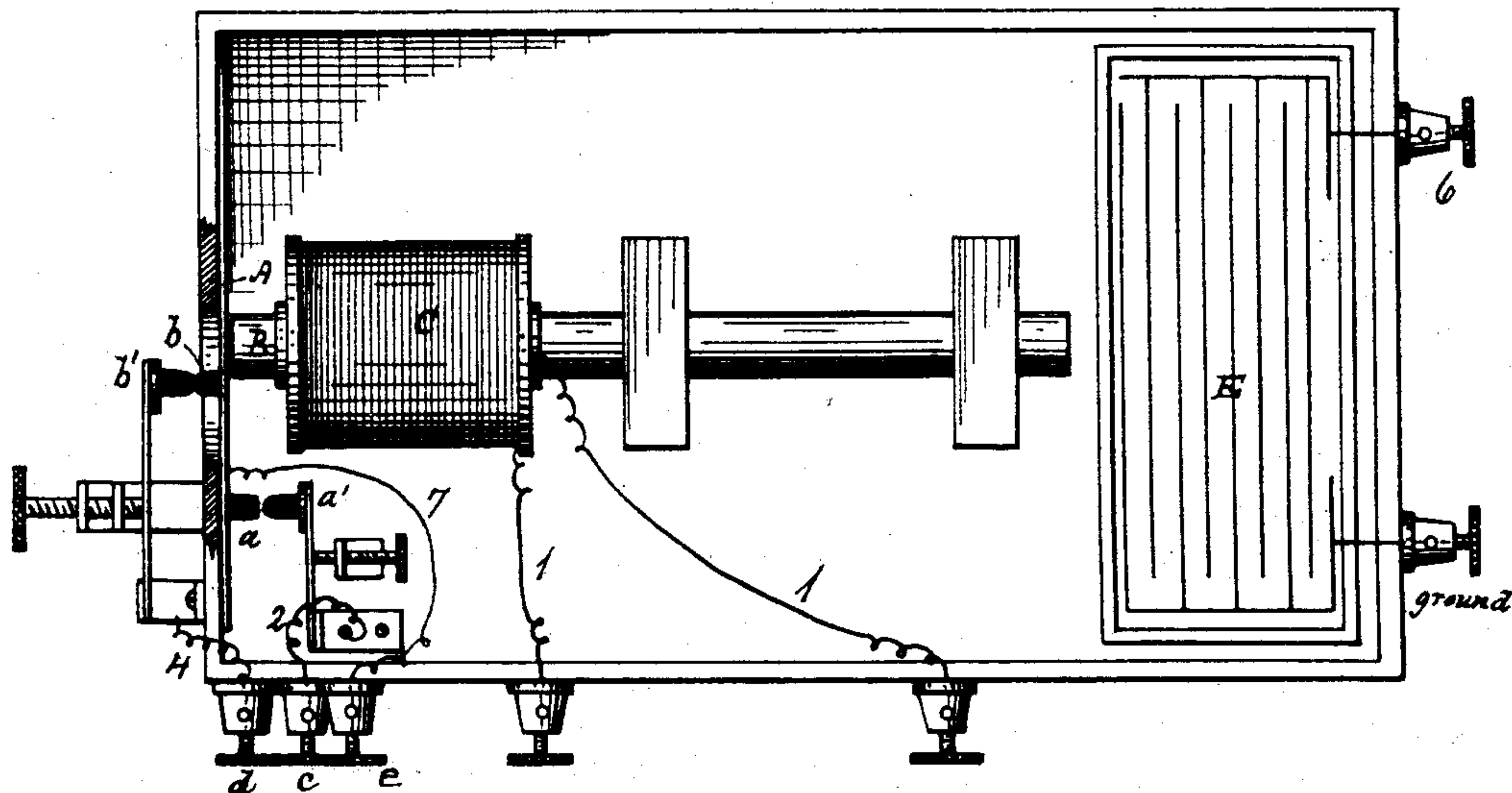
J. A. MALONEY.

TELEPHONIC REPEATER AND RELAY.

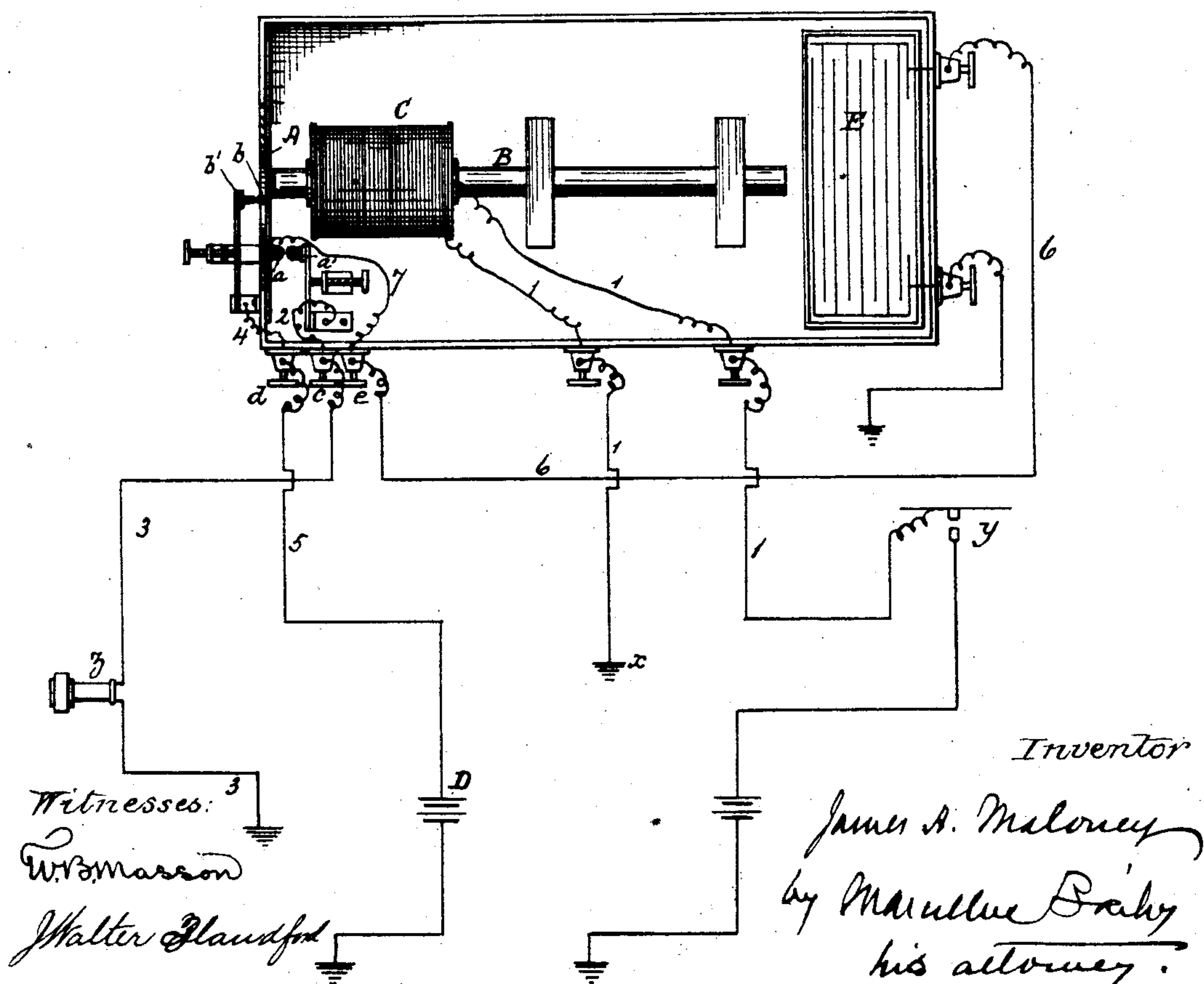
No. 287,449.

Patented Oct. 30, 1883.

*Fig. 1.*



*Fig. 2.*



# UNITED STATES PATENT OFFICE.

JAMES A. MALONEY, OF WASHINGTON, DISTRICT OF COLUMBIA.

## TELEPHONIC REPEATER AND RELAY.

SPECIFICATION forming part of Letters Patent No. 287,449, dated October 30, 1883.

Application filed March 3, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES A. MALONEY, of Washington city, in the District of Columbia, have invented certain new and useful Improvements in Telephonic Repeaters and Relays, of which the following is a specification.

My improvement has been designed with reference to the needs of telephonic communication over long lines—as, for instance, inter-city communication; and its object is to re-enforce by renewed electric energy at the receiving-station, or at intermediate stations along the line, the enfeebled current which influences the receiving or reproducing telephonic instrument.

In Letters Patent to me, No. 274,353, bearing date March 20, 1883, I have described and shown the combination, in a telephonic circuit, with a receiver and transmitter, of a condenser which is arranged and operates to intermittently discharge to line through the diaphragm of the transmitter when the latter is in use—both the circuit through which the condenser is charged and the circuit through which the condenser discharges to line being completed through the transmitter. By my present improvement I make use of substantially the same method of transmission as applied to the receiver in order to bring in a renewed electric energy, which is made available for the further transmission of the message, or for the reproduction of the same. To this end I combine with the instrument—which may be termed a “telephonic relay” or “repeater”—located at the point where it is desired to throw renewed electric energy into the line, a condenser, a battery for charging the same, and circuit-connections, substantially as hereinafter described, whereby, when the line is in use, both the circuit through which the battery charges the condenser and the circuit through which the condenser discharges to line are completed through the said instrument.

The nature of my invention and the manner in which the same is or may be carried into effect will be understood by reference to the accompanying drawings, in which—

Figure 1 is a plan of the receiving-instrument. Fig. 2 is a like view of the instrument,

on smaller scale, together with a diagrammatic representation of its circuit-connections.

The relay or repeating instrument represented in the drawings is one of that type of receiving-instruments in which the sound-vibrations are reproduced by a diaphragm, A, which is influenced by a permanent magnet, B, surrounded by a helix, C, in the line 1, of which one terminal is grounded, as at *x*, and the other terminal is in circuit with the transmitter *y* at the sending-station, as indicated diagrammatically in Fig. 2. I desire it to be understood, however, that receiving-instruments of other types can be employed.

Diaphragm A is made of conducting material. Upon one of its faces is a carbon contact, *a*, and upon its opposite face is a carbon contact, *b*. Opposite *a* is the spring-mounted carbon *a'*, electrically connected by wire 2 to binding-post *c*, which, by line-wire 3, is in connection with the receiver *z* at the station to which the message is to be transmitted from the sending-station *y*, the circuit being completed through receiver *z* to ground, as indicated in Fig. 2. Opposite *b* is the spring-mounted carbon contact *b'*, electrically connected by wire 4 to binding-post *d*, from which leads wire 5 to one pole of battery D, whose other pole is grounded. This battery is a local battery at the same station with the receiving-instrument or repeater A B C, and is designed to charge the condenser located at the same station. This condenser is indicated at E. One of its poles is electrically connected to the diaphragm A by wires 6 7 and binding-post *e*, and its other pole is grounded.

This completes a description of the instrumentalities employed. The adjustments of the carbon contacts are such that normally the points *a a'* have incomplete or imperfect contact with one another, and the points *b b'* are in full contact with one another, as indicated in the drawings. Thus, normally, when the line is not in use, the condenser E is in circuit with and is charged by battery D through *d 4 b b' A 7 e 6*; but when the diaphragm A is thrown into vibration by the receiving device B C—due to the action thereon of the electrical impulses on the line-wire 1 occasioned by speaking into the transmitter *y*—it will



make full contact between  $a a'$  and  $b b'$  alternately. When it makes full contact between  $b b'$ , the condenser is charged from battery D, as just stated. When, on the other hand, it  
 5 makes full contact between  $a a'$ , the condenser is put in circuit with line 3 and discharges to the receiver  $z$  through 6  $e$  7 A  $a a'$  2  $c$  3.

It will thus be seen that by means of this relay or repeater I am enabled to throw into  
 10 the line beyond it electrical impulses similar in character to those transmitted from  $y$  to the repeater or relay, both the circuit through which the local battery charges the condenser by which these electrical impulses are thrown  
 15 into the line and the circuit through which the condenser discharges to line being completed through the diaphragm of the relay or repeater.

I have shown the line arranged for transmitting in one direction only; but it will, of course, be understood that by duplicating the instruments at the several stations and properly connecting them up to line messages can be sent in both directions.

25 Having described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. A telephonic relay or repeater comprising the combination, with a receiving-instrument adapted to be put in circuit with and  
 30 acted on by the transmitter at the sending-

station, of a condenser, a battery, and circuit-connections, substantially as described, whereby both the circuit through which the battery charges the condenser and the circuit through  
 35 which the condenser discharges to line beyond the relay or repeater are completed through the said receiving-instrument, substantially as and for the purposes set forth.

2. In a telephonic system, the combination, 40 with the transmitter at the sending-station and the receiver at the receiving-station, of an intermediate receiving-instrument whose helix is in circuit with the transmitter, and whose diaphragm is in electrical connection with the  
 45 receiver at the receiving-station, and a condenser, a charging-battery therefor, and circuit-connections, substantially as described, whereby both the circuit through which the battery charges the condenser and the circuit  
 50 through which the condenser discharges to the line intermediate between the diaphragm and the receiving-station are completed through said diaphragm, substantially as and for the  
 55 purposes set forth.

In testimony whereof I have hereunto set my hand this 1st day of March, 1883.

JAMES A. MALONEY.

Witnesses:

J. WALTER BLANDFORD,  
 EWELL A. DICK.