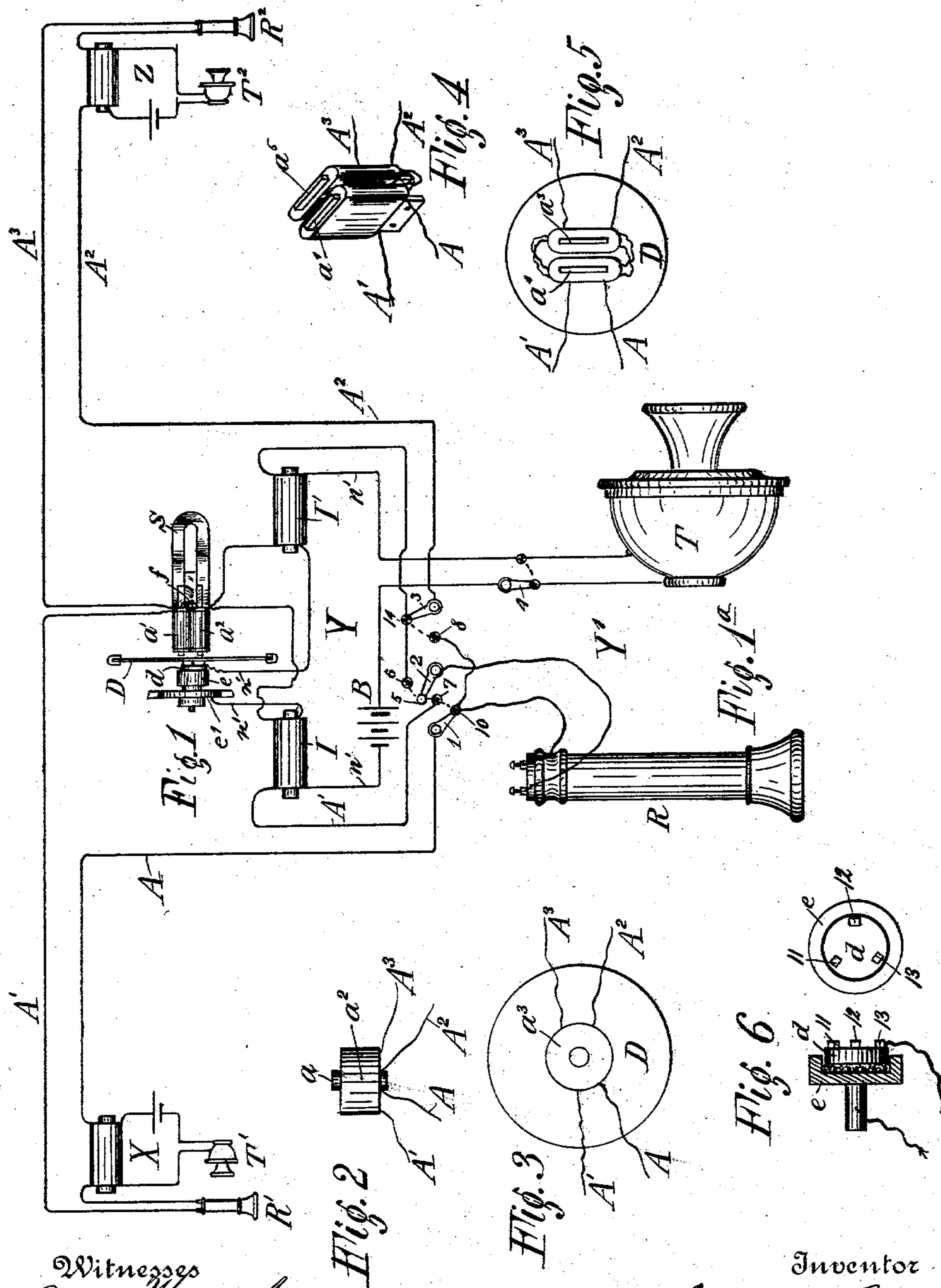


No. 753,252.

PATENTED MAR. 1, 1904.

M. GALLY.
TELEPHONE REPEATER.
APPLICATION FILED MAR. 18, 1903.

NO MODEL.



Witnesses
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TELEPHONE-REPEATER.

SPECIFICATION forming part of Letters Patent No. 753,252, dated March 1, 1904.

Application filed March 18, 1903. Serial No. 148,368. (No model.)

To all whom it may concern:

Be it known that I, MERRITT GALLY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Telephonic Repeaters, of which the following is a specification.

This invention relates to the matter of repeating telephone messages from one main line to another main line; and it consists in a peculiar construction and arrangement of apparatus and circuits for accomplishing such purpose.

In the accompanying drawings, Figure 1 represents three telephone-stations X, Y, and Z, (two terminal stations X and Z and the intermediate repeating-station Y.) Fig. 2 shows one form of the doubly-wound magnet. Fig. 3 is a plan view of the magnet shown in Fig. 2. Fig. 4 shows the doubly-wound cores of the bipolar magnet of the repeater, as shown in Fig. 1. Fig. 5 is a plan view of magnet shown in Fig. 4; and Fig. 6 is a view, partly sectional, of the cup-electrode, the button-electrode, and the intervening carbon granules.

This specification treats specially of the repeater having a receiving-magnet with two cores, each core being doubly wound or having two coils thereon.

The two magnet-cores with their windings are shown at $a' a^2$, Fig. 1. The cores with their double winding are shown enlarged in Figs. 4 and 5.

In Fig. 1, D is the receiving and retransmitting diaphragm, and the bipolar magnet $S a' a^2$ is not unlike those of an ordinary telephone-receiver, except that its cores are wound each with two wires. One of these wires connects with main line A A' and the other wire connects with the other main line A² A³. The vibrations of diaphragm D, caused by the magnetic impulses of the receiving-magnet, are transferred to the electrode-button d , which is in the primary circuit n' , completing the circuit through the carbon granules in cup e and the support e' . Battery B provides energy for the primary circuit $n' n'$.

The retransmitting device operates for both of the main lines, and the two induction-coils I and I' in the primary circuit connect by their secondary wire one with one of the main lines and the other with the other main line. The electric pulsations coming from station X arriving at the repeater, Fig. 1, energize the receiving-magnet, which then operates on the retransmitting device by means of the diaphragm D and also the opposite induction-coil by energy from battery B, repeating the pulsations into the other main line, which are finally received at the other distant terminal station Z. The operation in the opposite direction is the same. Therefore messages can be alternately passed in both directions from X to Z, and vice versa. The coils of the receiving-magnet are alike and the wires wound together, and the wires of the two induction-coils are alike, and the primary wires being both energized by the same battery-circuit and both secondaries connected with line there is no possible confusion in the combined operation of the whole. A branch from both lines is extended to switches 1, 2, and 3, by means of which switches a local receiver R at Fig. 1^a is switched in or out of either one of the main lines at will, or the lines may be connected to cut out the repeater for way messages. The transmitter T is switched in or out of the primary circuit by means of switch 4 and either line used for transmission or both at once.

Fig. 6 shows in section the repeating carbon-cup electrode with carbon granules, the button-electrode, and a plan view of the same.

Other forms of transmitting elements may be used. The only peculiarity in what is here shown is the three small blocks 11 12 13, attached to or forming a part of the button as supporting touch-pieces. These blocks are preferably of wood, as such are best as to vibratory quality. They are preferably quite small at their touching face, but not pointed. They are best arranged in a triangle, as shown, so as to hold the button in perfectly even touch with the face of the diaphragm D. They are adjusted to a light touch only with the dia-

phragm and are connected only with the button, so as not to dampen or put any strain on the diaphragm. They should be placed in such position on the button relatively to the face of the diaphragm as to secure the best vibratory result. This will depend to a considerable extent on the diameter of the diaphragm, and the best position can be determined by finding and avoiding its nodal lines.

At station Y the transmitter T is thrown into the primary circuit $n' n'$ or cut out by the switch 4, as desired. When the transmitter T is in circuit, as shown, if the receiver R is thrown into line $A^2 A^3$ by means of switches 2 and 3 station Y will be in communication with station Z. If switch 3 remains, as shown, and switch 2 is connected to line A' , station Y will be in communication with station X. If main line $A A'$ be completed as a "round circuit" by connecting its terminal at switch 1 and main line $A^2 A^3$ be completed as a round circuit, as shown at switch 3, and transmitter T thrown out of the primary circuit by switch 4, then station X will be in communication with station Z back and forth through the repeater. It is not really necessary to cut the transmitter T out of the primary circuit in such case, but it is better to do so, as it relieves the primary circuit of unnecessary resistance.

More than three projections may be attached to or formed on the face of the button-electrode to make touch with the diaphragm and with good effect if great care is taken to have all touch alike; but three are much more easily adjusted, and the three points of contact govern and preserve the exact position. Less than three projections are too uncertain, as they will allow canting of the button, and therefore cramping of its action.

Much of the success of the instrument depends on the position and careful adjustment of the three touching points.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a telephonic repeating device; a receiving-magnet having two cores, placed on one side of a receiving-diaphragm and having two wires wound on each core; connections for two main-line circuits for separately energizing the magnet to vibrate the diaphragm.

2. In a telephonic repeating device; a receiving-magnet having two cores, placed on one side of a receiving-diaphragm and having two wires wound on each core; connections for two main-line circuits for separately energizing the magnet to vibrate the diaphragm; and a retransmitting device in combination with the diaphragm.

3. In a telephonic repeating device; combined receiving and retransmitting means, comprising a plurality of doubly-wound magnet-cores; one of the wires of each, connected

with one telephone-line, and the other wire connected with another telephone-line; and additional energizing means for reinforcing the main-line current.

4. In a telephonic repeating device; combined receiving and retransmitting means; comprising a plurality of doubly-wound coils; one of the wires of each, connecting with one telephone-line; and the other wire connected with another telephone-line; the two wires of each coil wound in the same direction and connected alike as to polarity of current; and additional energizing means for reinforcing the main-line current.

5. In a telephonic repeating device; two secondary induction-coils, each attached separately to one of two telephone-lines; a compound receiving and transmitting coil consisting of two wires wound together in the same direction; one of the wires connected to one of the telephone-lines and the other wire connected to the other telephone-line.

6. In a telephonic repeater comprising a repeating magnet having two coils; to connect with different telephone-lines; a receiving-diaphragm, and a transmitting device operated by the diaphragm; an electrode having three supporting touch-pieces attached thereto or forming a part thereof, and arranged between the button-electrode and the diaphragm for supporting the button, and in touch with the diaphragm.

7. In a telephonic repeater; a diaphragm for receiving pulsations from one main line, and transmitting the same to another main line; and a bipolar magnet; the two pole-pieces doubly wound, both pieces with wire for connecting with both of the main lines.

8. In a telephonic repeater; the combination with its receiving-diaphragm, of the transmitting button-electrode, having three touch-pieces made of wood, and in touch with the diaphragm.

9. In a telephonic repeater, comprising a repeating-magnet having two coils, to connect with different telephone-lines; a receiving-diaphragm, and a transmitting device operated by the diaphragm; a button-electrode having three supporting touch-pieces attached thereto or forming a part thereof, and in touch with the diaphragm; a second electrode; and carbon granules placed between the electrodes.

10. In a telephonic repeater; a primary electric circuit; having therein means for primary induction; two secondary coils, with connections for two telephone-lines; a combined receiving and retransmitting device; the transmitting portion comprising a cup-electrode having carbon granules therein, a button-electrode in contact with the granules, and in loose contact with the receiving-diaphragm, the button having attached thereto or forming a part thereof three touch-pieces to pre-

serve a free and even touch with the diaphragm.

11. In a telephonic repeater; a primary electric circuit having therein means for primary
5 induction; two induction-coils with connections for two telephone-lines; a combined receiving and retransmitting device for repeating; and a local transmitter at the repeating-

station with means for connecting said local transmitter with and to operate interchangeably the two telephone-lines.

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