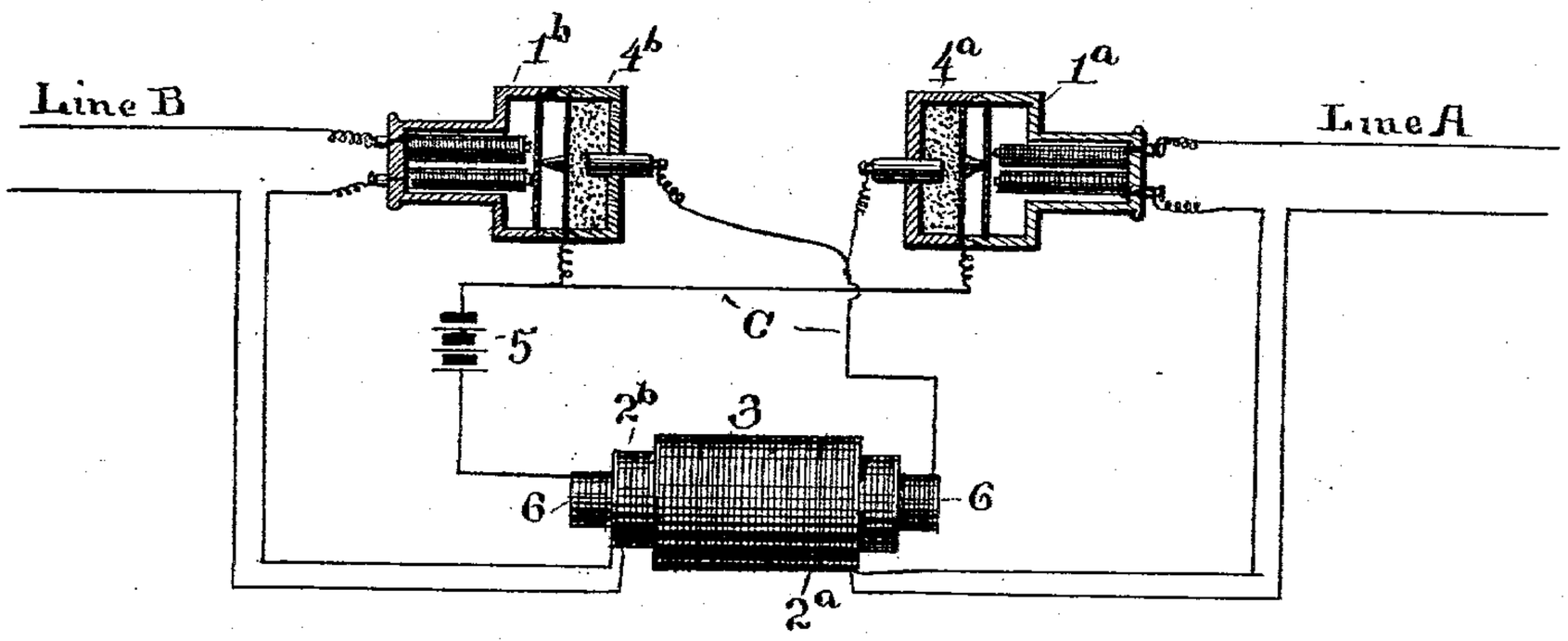
No. 743,589. PATENTED NOV. 10, 1903.

G. E. SUNDQUIST.

TELEPHONE RELAY OR STEP-UP.

APPLICATION FILED MAY 14, 1902.

NO MODEL.



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No. 743,589. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

GUSTAVUS E. SUNDQUIST, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO ALBERT H. WAHL, OF CLEVELAND, OHIO.

TELEPHONE RELAY OR STEP-UP.

SPECIFICATION forming part of Letters Patent No. 743,589, dated November 10, 1903.

Application filed May 14, 1902. Serial No. 107,231. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVUS E. SUNDQUIST, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Telephone Relays or Step-Ups; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to telephone relays or "step-ups," and has for its object to provide improved means whereby sound undulations conveyed by one line or line-section may be transmitted to another line or line-section with increased volume and to so arrange said means that the lines may be worked from either direction.

For a clear understanding of my invention I have in the accompanying drawings illustrated diagrammatically the embodiment thereof in suitable mechanical devices.

Figure 1 represents a preferred embodiment thereof employing a triple-wound induction-coil of peculiar arrangement and a single primary battery, and Fig. 2 represents a somewhat modified arrangement employing two ordinary induction-coils and two primary batteries.

In the drawings, A and B represent, respectively, two separated lines or line-sections, which may consist of closed metallic circuits, grounded circuits, or one metallic and one grounded circuit.

In the form of my invention shown in Fig. 1, 1^a and 1^b are receivers or hand-phones, preferably of the bipolar type, arranged, respectively, in the line-circuits A and B.

2^a and 2^b are secondaries of an induction-coil, (indicated as a whole by 3,) said secondaries being likewise included, respectively, in the circuits A and B.

4^a and 4^b indicate microphone-transmitters opposed, respectively, to the receivers or hand-phones 1^a and 1^b and both arranged in a common primary circuit C, including therein a battery 5 and the primary 6 of the induction-coil 3. The induction-coil is thus triple-wound with two secondaries and one primary. By this arrangement the electrical impulses received by one secondary are transmitted to the other.

The transmitters 4^a and 4^b are preferably of the granular-carbon type and are preferably screwed or otherwise secured directly to the face of their respective receivers, so that the vibrations of the receiver-diaphragm are communicated directly thereto.

The circuit through the relay may be traced as follows: Assuming that the message is received from line A for transmission over line B, the sound-producing undulations enter on line-circuit A, pass through the receiver 1^a and the secondary 2^a, and thence return by the metallic circuit or to ground. The secondary 2^a influences the secondary 2^b, inducing talking-currents therein of equal strength with those received, while the receiver 1^a transmits the vibrations occasioned therein directly to the microphone 4^a, causing corresponding undulations in the primary circuit, including the primary coil and the primary battery. The current thus produced in the primary circuit induces in the secondary coil 2^b talking-currents of the desired intensity, which are transmitted over the line B, as will be readily understood.

The symmetrical arrangement of parts permits the relay to operate from either side, so when voice-currents are sent over the line B they pass through receiver 1^b and the secondary 2^b, and thence to return, and the secondary 2^b induces currents in the secondary 2^a, while the receiver 1^b transmits vibrations to the microphone 4^b, causing corresponding undulations in the primary of the induction-coil.

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

1. A telephone-relay embodying in combination two lines or line-sections, each having in its circuit a receiver and a secondary of an induction-coil, an independent microphone opposed to each of said receivers and arranged to receive vibrations therefrom, a common primary circuit for said microphones including a source of electrical supply and a primary coil arranged to influence both of the secondary coils; substantially as described.

2. A telephone-relay embodying in combination two lines or line-sections each having in its circuit a receiver, an induction-coil comprising two secondary and one primary coils, one of said secondaries being arranged in the circuit of each line and receiver, an independent microphone operatively associated with each receiver, and a common circuit for said microphones including a source of electrical supply and the primary of the induction-coil.

3. In a telephone relay or repeater, the combination with two adjoining lines, each having in series circuit therein a coil arranged for inductive effect and a telephone-receiver, of a single closed local circuit including therein a coil arranged in inductive relation to both of the line-coils, a primary source of electric supply, and two microphones operatively associated with the two line-receivers.

In testimony whereof I affix my signature in presence of two witnesses.

GUSTAVUS E. SUNDQUIST.

Witnesses:
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