

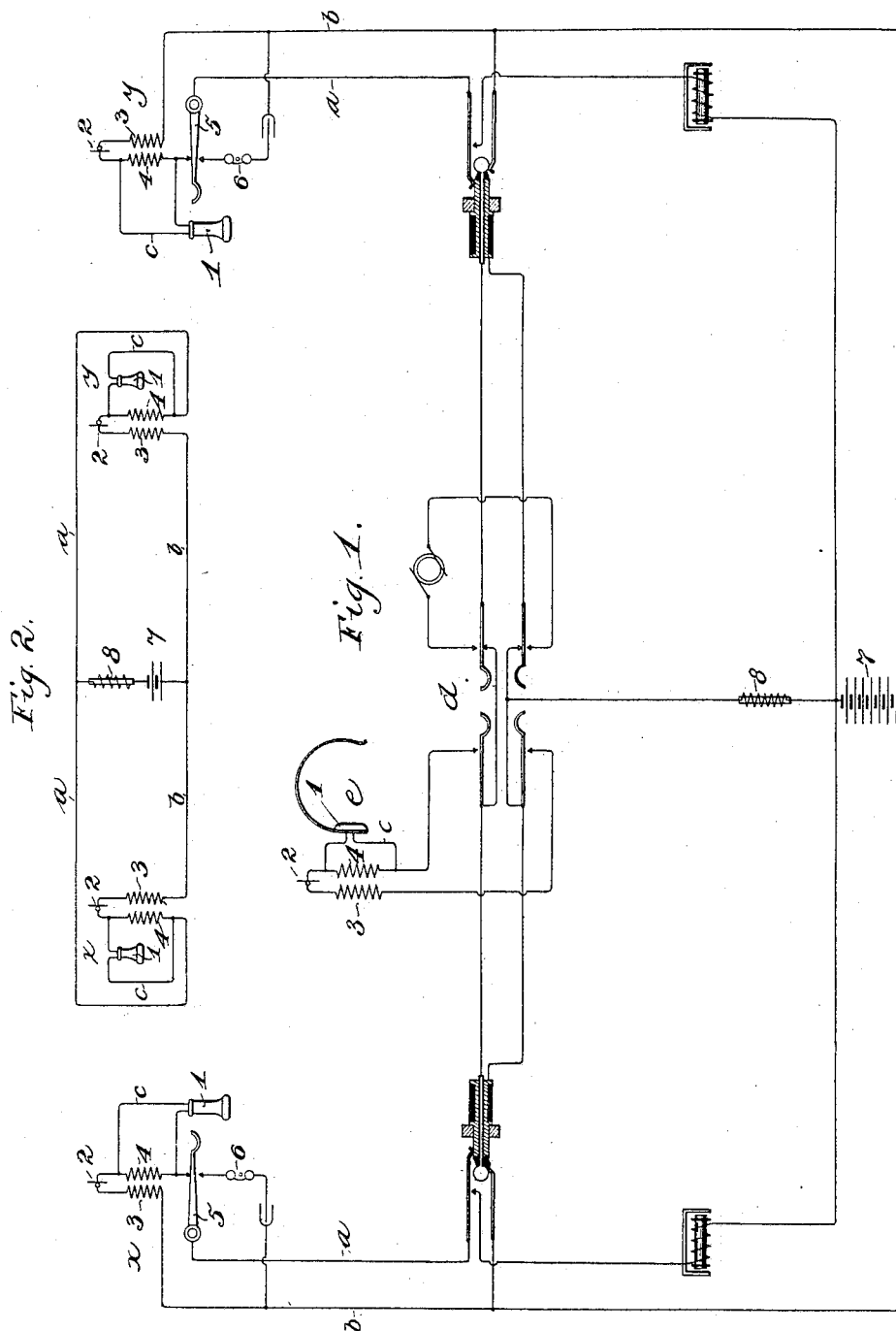
No. 766,223.

PATENTED AUG. 2, 1904.

W. M. DAVIS.
TELEPHONE SYSTEM.

APPLICATION FILED MAR. 9, 1903.

NO MODEL.



Witnesses
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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 766,223, dated August 2, 1904.

Application filed March 9, 1903. Serial No. 146,918. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. DAVIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephone Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone systems, and has for its object improved disposition of apparatus and connections whereby telephonic currents are greatly increased in strength and transmission of voice-currents improved.

I will describe my invention as used in connection with substation apparatus, although its use is not limited to that arrangement of apparatus, and I employ substation apparatus, which may consist of a receiver, a transmitter, primary and secondary windings, and suitable switching mechanism. I preferably include the primary and the secondary windings serially in circuit with the transmitter, the transmitter being preferably connected between the primary and the secondary windings. The receiver-circuit preferably forms a shunt about the secondary winding. The primary and secondary windings are also preferably of substantially equal resistance, and to this end I may advantageously employ a coil, such as is described in my Patent No. 715,999, issued December 16, 1902. The fact that the primary and secondary windings are of substantially equal resistance in itself tends to strengthen the telephonic currents, for the reason that the impedance in the primary circuit is counteracted by the effect of the secondary circuit. However, by arranging the apparatus and connections as above described I find that I can still further increase the strength of the talking-currents in the receiver, the apparent cause for this being the inducing effect of the primary winding upon the secondary winding. The talking-currents pass serially through the primary and secondary windings, and the receiver, which is connected in a shunt-circuit around the secondary

winding, receives directly a portion of the current flowing in the circuit, and in addition it receives the currents induced upon the secondary winding by the primary winding, the two currents coöperating in their effect upon the receiver.

I shall describe my invention more clearly by referring to the accompanying drawings, in which in Figure 1 I have shown the application of the invention to a common-battery system and have shown two subscribers connected together for conversation by means of central cord mechanism and circuits, and in Fig. 2 I have shown diagrammatically the position and arrangement of circuits in accordance with my invention, like characters of reference referring to like parts throughout the figures.

The substation apparatus consists of a receiver 1, a transmitter 2, a primary winding 3, secondary winding 4, a switch-hook 5, and a signal 6, the signal being included in circuit with a condenser connected across the line when the receiver is on the hook. The primary winding 3, the transmitter 2, and the secondary winding 4 when the subscriber removes the receiver from the hook are included serially in circuit with the limbs *a* *b*, extending between the subscribers, the transmitter being connected between the primary and the secondary windings. A common battery 7 in circuit with impedance 8 may be connected across the limbs *a* and *b*. The circuit, including the receiver 1, forms a shunt *c* about the secondary winding 4. Windings 3 and 4 may be made of substantially the same resistance, and the coil containing the windings may be such as is described in my patent hereinbefore referred to, the object of this substantially equal resistance in the windings being to destroy the impedance to the talking-currents in a manner as described in the patent referred to. In addition to thus strengthening the talking-currents I find that by the use of my improved connections they are still further increased in strength, apparently caused by the inducing effect of the primary winding upon the secondary winding.

When the subscribers are in talking relation, as shown, voice-currents initiated at substation *x* are received at station *y* through limb *a*, secondary winding 4, transmitter 2, primary winding 3, and back through limb *b*. The receiver, which is included in the shunt *c*, receives directly a portion of the currents flowing through the circuit just traced, and in addition it receives the currents induced upon the secondary winding by the primary winding, the direct and the induced currents coöperating in their effect upon the receiver. The talking-circuit between the substations may include at the exchange a suitable cord-circuit *d*, the common battery 7, and the impedance 8. My invention may also advantageously be applied to the operator's circuit *e*, associated with the cord-circuit.

I do not wish to have my invention limited to uses as herein referred to, as it may be employed wherever the coöperative effect of direct and induced currents would be of advantage; but,

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a telephone system, the combination with the primary and secondary windings of an induction-coil included only serially between the limbs of a telephonic circuit, of a battery and a transmitter included in said circuit, and a receiver included in a shunt-circuit about said secondary winding whereby to receive directly a portion of the current flowing in said circuit and to receive in addition the currents induced upon the secondary winding by the primary winding, substantially as described.

2. In a telephone system, the combination with the primary and secondary windings of an induction-coil, said windings being included only serially between the limbs of a telephonic circuit, of a battery and a transmitter included in said circuit, said secondary winding having substantially the same resistance as the primary winding whereby to counteract impedance in said circuit, and a receiver included in a shunt-circuit about said secondary winding whereby to receive directly a portion of the current flowing in said circuit and to receive in addition the currents induced upon the secondary winding by the primary winding, substantially as described.

3. In a telephone system, the combination with subscribers' substations, of a circuit for connecting subscribers for conversation, means at one of said substations for initiating voice-currents in said circuit, an induction-coil at another station having its primary and secondary windings included only serially in said circuit, and a receiver connected in parallel with said secondary winding whereby to receive directly a portion of the voice-currents flowing in said circuit and to receive

said currents inductively, substantially as described.

4. In a telephone system, the combination with subscribers' substations, of a circuit for connecting subscribers for conversation, means at one of said substations for initiating voice-currents in said circuit, an induction-coil at another station having its primary and secondary windings included only serially in said circuit, and a receiver connected in parallel with said secondary winding whereby to receive directly a portion of the voice-currents flowing in said circuit and to receive said currents inductively, the primary and secondary windings of said induction-coil being of substantially equal resistance whereby the impedance in said circuit is counteracted, substantially as described.

5. In a telephone system, the combination with a battery and a transmitter included in a telephonic circuit, of the windings of an induction-coil included only serially in said circuit, and a receiver connected in a shunt-circuit about one winding of said coil, said shunt-circuit including only said receiver, substantially as described.

6. In a telephone system, the combination with a battery and a transmitter included in a telephonic circuit, of the windings of an induction-coil included only serially in said circuit, and a receiver connected in a shunt-circuit about one winding of said coil, said shunt-circuit including only said receiver, the windings of said induction-coil having substantially the same resistance whereby to counteract the impedance in said telephonic circuit, substantially as described.

7. In a telephone system, the combination with the primary and secondary windings of an induction-coil included only serially in a telephonic circuit, of a battery and a transmitter included in said circuit, and a receiver included in a shunt-circuit about said secondary winding, said shunt-circuit including said receiver only, substantially as described.

8. In a telephone system, the combination with the primary and secondary windings of an induction-coil included only serially in a telephonic circuit, of a battery and a transmitter included in said circuit, said secondary winding having substantially the same resistance as the primary winding whereby the impedance in said telephonic circuit is counteracted, and a receiver included in a shunt-circuit about said secondary winding, said shunt-circuit including said receiver only, substantially as described.

9. The combination with a telephone-circuit including only serially and in the order named, a battery, a primary winding of an induction-coil, a transmitter, and a secondary winding of an induction-coil, of a receiver connected in a shunt-circuit about said secondary winding, substantially as described.

10. The combination with a telephone-circuit including only serially and in the order named, a battery, a primary winding of an induction-coil, a transmitter, and a secondary
5 winding of an induction-coil, of a receiver connected in a shunt-circuit about said secondary winding, said shunt-circuit including said receiver only, substantially as described.

11. The combination with a telephone-circuit including only serially and in the order
10 named, a battery, a primary winding of an induction-coil, a transmitter, and a secondary winding of an induction-coil, of a receiver connected in a shunt-circuit about said secondary
15 winding, the resistances of said primary and secondary windings being substantially equal whereby impedance in said telephone-circuit is counteracted, substantially as described.

12. The combination with a telephone-circuit including only serially and in the order
20 named, a battery, a primary winding of an induction-coil, a transmitter, and a secondary winding of an induction-coil, of a receiver connected in a shunt-circuit about said secondary
25 winding, the resistances of said primary and

secondary windings being substantially equal whereby impedance in said telephone-circuit is counteracted, said shunt-circuit including said receiver only, substantially as described.

13. In a telephone system, the combination
30 of an induction-coil, one winding of said coil being connected to one line-limb and with the other line-limb only through the other winding of said coil, a transmitter included serially in circuit with the windings, and a receiver
35 connected in an independent shunt-circuit about one of said windings.

14. In a telephone system, the combination with two line-limbs connected together at a
substation only serially through the windings
40 of an induction-coil, of a transmitter included serially in circuit with the windings, and a receiver bridging one of said windings.

In witness whereof I hereunto subscribe my name this 6th day of March, A. D. 1903.

WILLIAM M. DAVIS.

Witnesses:

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