

No. 731,166.

PATENTED JUNE 16, 1903.

H. D. CURRIER.
ELECTRIC TELEPHONE SYSTEM.
APPLICATION FILED MAY 16, 1902.

NO MODEL.

FIG. 1

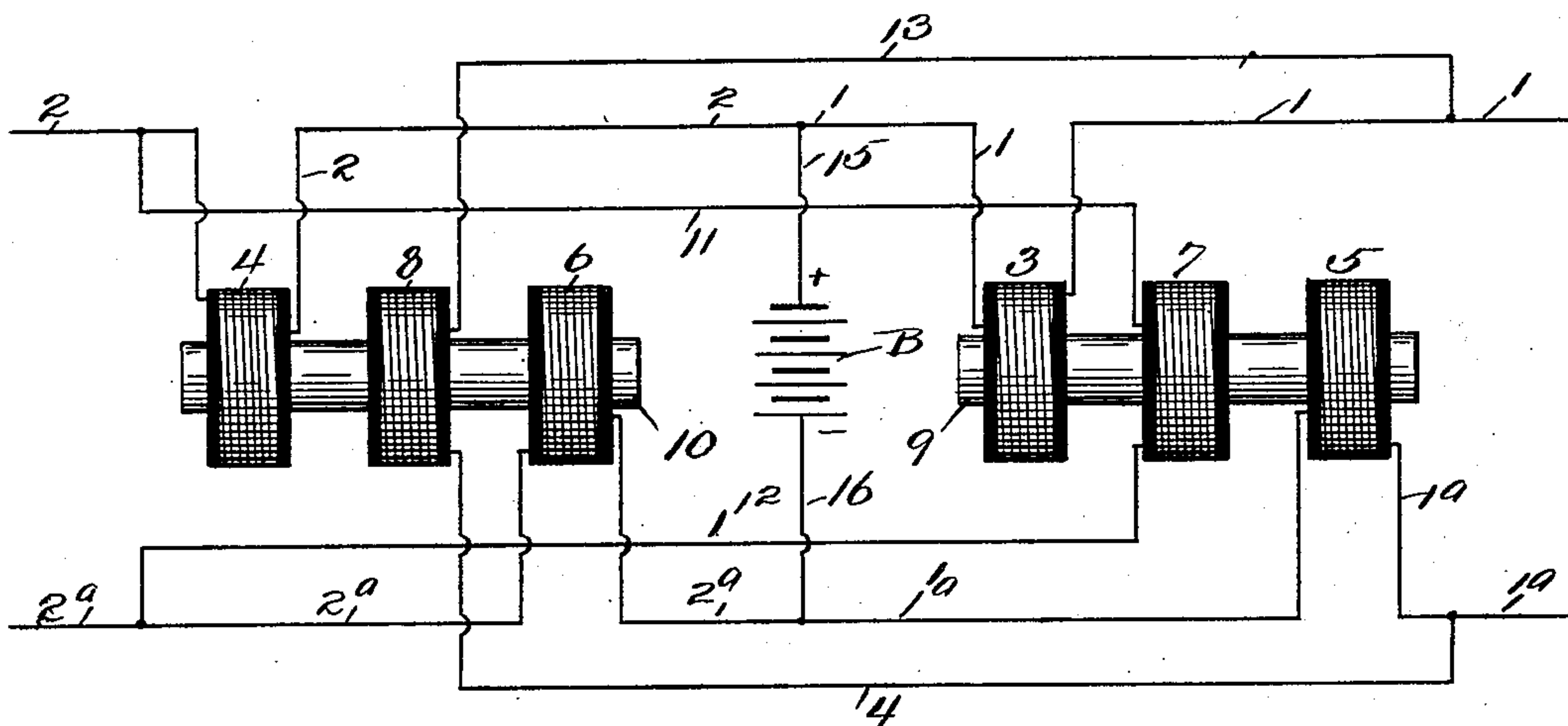
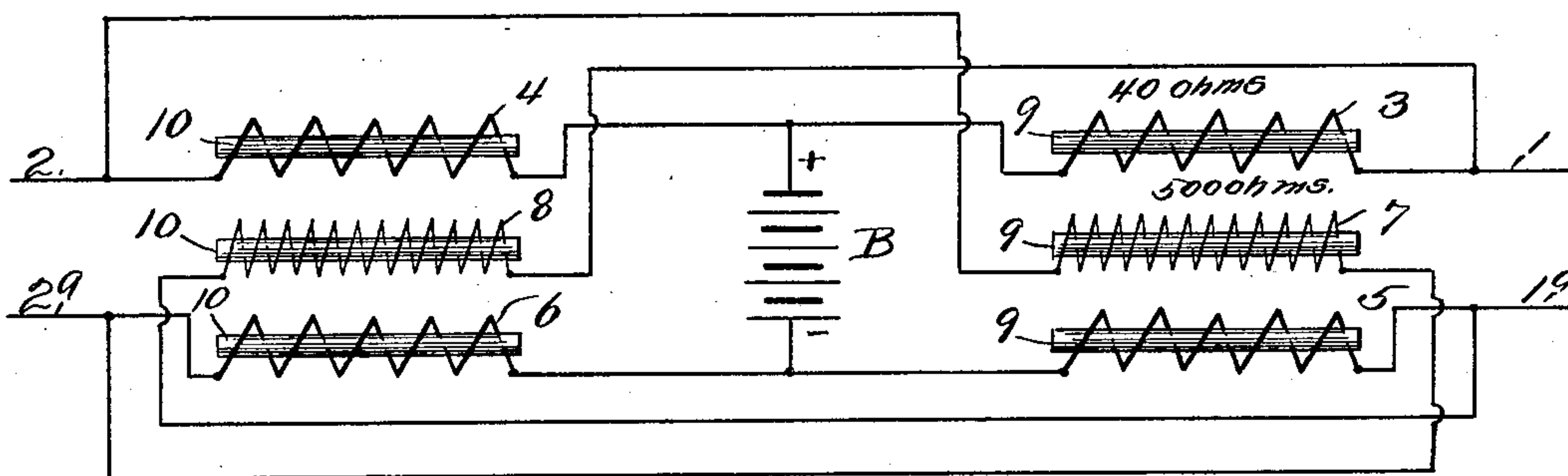


FIG. 2



Witnesses:
Ray White,
Cary B. White.

Inventor:
Hiram D. Currier:
By J. B. Bain, Attorney.

UNITED STATES PATENT OFFICE.

HIRAM D. CURRIER, OF OTTAWA, OHIO, ASSIGNOR OF ONE-HALF TO
JACOB M. LORENZ, OF CHICAGO, ILLINOIS.

ELECTRIC TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 731,166, dated June 16, 1903.

Application filed May 16, 1902. Serial No. 107,686. (No model.)

To all whom it may concern:

Be it known that I, HIRAM D. CURRIER, of Ottawa, in the county of Putnam and State of Ohio, have invented certain new and useful Improvements in Electric-Telephone Systems; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in electric-telephone systems, and especially to that class of systems known in the art as "central energy," wherein subscribers' communicating lines from the exchange are jointly energized by a source of current located centrally in the exchange.

The object of my invention is to provide an exchange system wherein the subscribers' lines communicating therewith may be jointly energized by means of a source of current local to the central exchange, at which point the switching of the various lines is accomplished, whereby the voice-currents are increased in electromotive force and are carried around the impedance devices of the system.

Another object of my invention is to provide a means whereby two connected lines may be energized from the same source of current and whereby the voice-currents from one line are inductively reproduced and carried by the impedance devices of the system to the connected line.

A further object of my invention is to provide the means described and a further means whereby the voice-currents originating in one line are inductively produced and increased in electromotive force and directly transmitted to the outgoing connecting-line and whereby the source of current which is common to both lines may be utilized to energize and operate the instruments for both lines that are susceptible of influence of such currents.

With these and other objects in view, which may hereinafter appear, my invention consists in the system comprising the arrangement, location, and use of the devices and apparatus herein shown and described.

In the drawings, Figure 1 is a partly dia-

grammatic view of the system as it appears at the central-exchange switchboard. Fig. 2 is a purely diagrammatic view of the same.

In both views the same reference-numerals indicate similar parts.

B is a battery which illustrates the source of current for energizing the connecting-lines that are brought into the switchboard and are from time to time connected together.

1 and 1^a represent a subscriber's line.

2 and 2^a represent another subscriber's line connected to the first line in the central-exchange office by any convenient switching method.

The lines 1 and 2 are connected together through the primary coils 3 and 4. The lines 1^a and 2^a are connected together through the primary coils 5 and 6. These primary coils may each in practice be wound to about forty ohms resistance. Coils 7 and 8 are secondary coils. These coils will work very well when wound to a resistance of about five hundred ohms each. The secondary coil 7 is in inductive relation to the joint effects of the coils 3 and 5, and the secondary coil 8 is in corresponding relation to the coils 4 and 6.

9 and 10 are the respective iron magnetic cores of the two induction systems. In the diagram Fig. 2 I have shown a separate induction-core for each one of the coils for clearness of illustration. It is understood that the coils 4, 8, and 6 are in inductive relation to each other and that the coils 3, 7, and 5 are in similar inductive relation. The secondary coil 7 of the first system is connected to the subscribers' line-wires 2 and 2^a beyond the second system by means of the connecting-wires 11 and 12. The secondary induction-coil 8 of the second system is in like manner connected to the subscribers' line-wires 1 and 1^a beyond the primary series coils of the first induction system. The battery B is connected to the line-wires 1 and 2 by the wire 15 and to the line-wires 1^a and 2^a by the wire 16.

The operation of my device is as follows: The direct current from the battery B flows out over the wire 15, over the subscribers' line-circuit wire 1, through the coil 3, returning through the wire 1^a, the coil 5, and the

wire 16, and jointly it will flow through the wire 2, the coil 4, returning through the wire 2^a, the coil 6, and the wire 16 and will operate any device in the circuit in the exchange
 5 or any of the subscribers' stations that are made responsive to a direct current. The electric impulses produced by voice-waves coming over the wires 1 and 1^a will produce similar effects in the coils 3 and 5 of the first
 10 system. This will produce inductive impulses in the secondary coil 7, which may be made of a higher electromotive force, corresponding to the difference in the ampere-turns of the primary and secondary coils of
 15 the first system. Induced impulses, corresponding in character to the impulses in the circuit in which they originate, will be conducted to circuit 2 and 2^a over the wires 11 and 12 beyond the inductive effects of the
 20 entire system, while the original primary impulses coming in on one line are readily provided with a short-circuited path through the battery and the induction-coils. The inductive effect of these influences produce
 25 impulses of like character and which may be made of higher electromotive force and are sent on the opposite line to which the first line is connected. It is of course to be understood that the impulses coming in on line 2 and 2^a
 30 will have the corresponding effect with reference to line 1 and 1^a in a manner plainly apparent to those skilled in the art.

It will be observed that each of the secondary coils practically short-circuit the battery
 35 B; but inasmuch as these coils offer considerable impedance to the highly-inductive voice-currents these currents will pass out over the respective subscribers' line-wires in preference to taking the path through the respective
 40 inductive secondary coils.

While I have indicated the resistance of the respective primary and secondary coils which I have found to be practical, I wish it to be distinctly understood that I do not limit my
 45 invention to the resistance mentioned nor to the proportion of said resistances.

Instead of applying my system solely to exchange purposes it may be used with any two
 50 connecting lines, whereby the voice-currents coming in on the line may be intensified and

transmitted to the connecting line for the purpose of long-distance transmission.

Having described my invention, what I claim as new and useful, and desire to secure by Letters Patent of the United States, is— 55

1. In a telephone system, two line-circuits, means for supplying electric energy thereto, a primary induction-coil in each of said line-circuits, and a secondary coil connected in each line-circuit in shunt around the source
 60 of electrical supply therefor, and arranged in inductive relation to the primary coil of the opposite line-circuit.

2. A telephone system comprising two line-circuits connected in series, a common central source of electric energy joining the legs of the connected circuits, a primary induction-coil associated with each line-circuit, and a secondary induction-coil for each line-circuit bridged between the legs thereof and induc-
 70 tively related to the primary coil of the opposite line-circuit.

3. A telephone system comprising two line-circuits connected in series, a central source of electric supply bridged across said connected circuits, and supplying current to both
 75 in common, primary induction-coils in series with the respective lines, and two secondary coils, one bridged across the legs of each line and arranged in inductive relation to the
 80 primary coils of the opposite line.

4. A telephone system comprising two line-circuits, a source of electric energy bridged across and joining the said line-circuits, a primary induction-coil in each line-circuit, a
 85 secondary induction-coil bridged across each of the line-circuits in inductive relation to the respective primary coils of the opposite line-circuit, each of said secondary induction-coils being connected in its respective circuit at
 90 points beyond the primary coils of said circuits.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HIRAM D. CURRIER.

Witnesses:

J. W. SMITH,
 G. W. RISSER.