

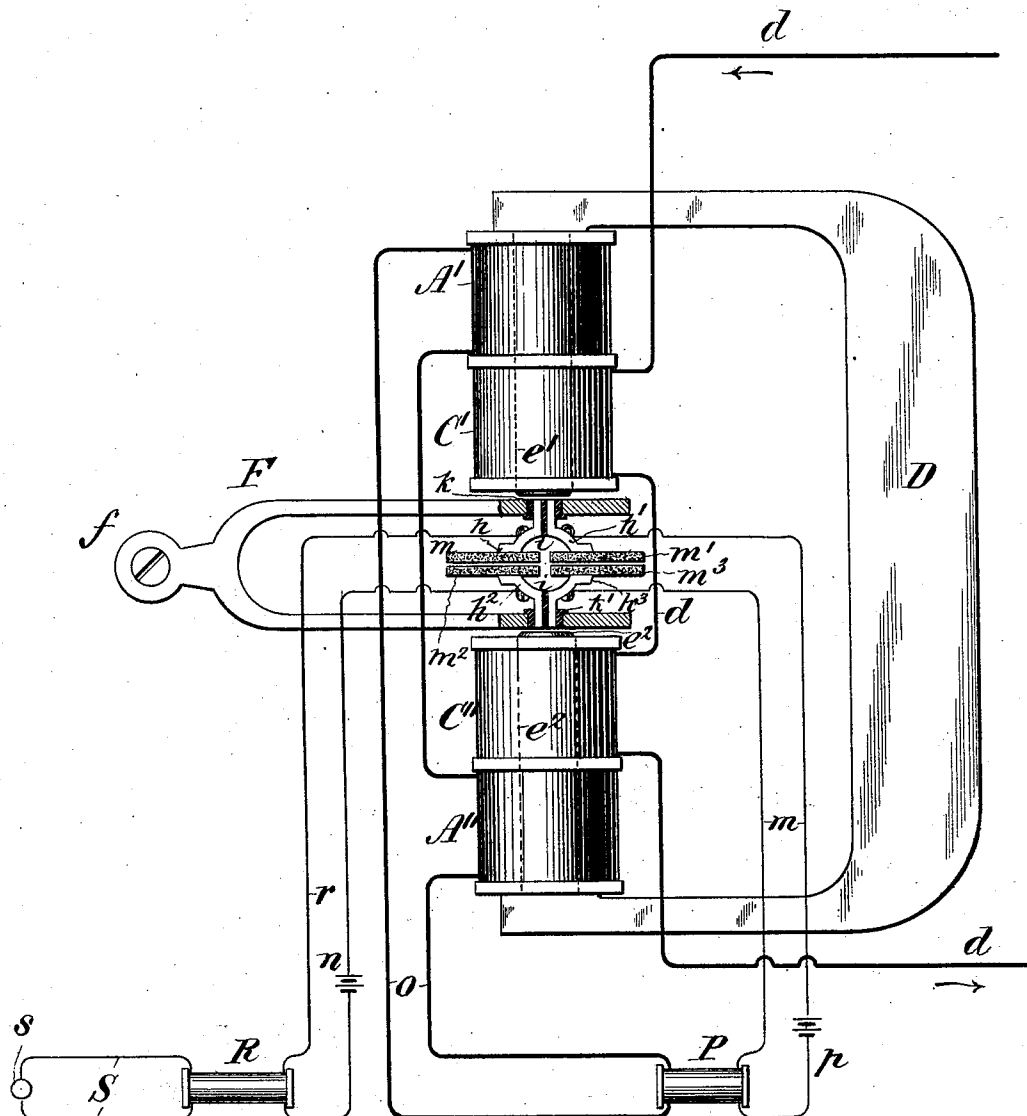
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Patented Dec. 10, 1901.

G. A. CARDWELL.
TELEPHONY.

(Application filed Nov. 16, 1899. Renewed May 10, 1901.)

(No Model.)



WITNESSES:

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TELEPHONY.

SPECIFICATION forming part of Letters Patent No. 688,293, dated December 10, 1901.

Application filed November 16, 1899. Renewed May 10, 1901. Serial No. 59,681. (No model.)

To all whom it may concern:

Be it known that I, GEORGE ALEXANDER CARDWELL, of the city, county, and State of New York, have invented a new and useful
5 Improvement in the Art of Telephony, of which the following is a specification.

The object of my invention is to reinforce the magnetic effect of a main-line telephone-current. This is accomplished by causing electrical pulsations from a local battery of the
10 same kind and having the same characteristics as the pulsations of the main line to influence the main-line magnet. The variations of pressure between the electrodes of a
15 microphone in the main circuit are utilized to cause these corresponding pulsations in the auxiliary or local circuit.

The drawing accompanying my application and forming a part of the specification illustrates diagrammatically a system embodying
20 my improvement, and it is to be distinctly understood that the principle underlying my improvement may be employed in a variety of ways.

25 In the drawing, D designates a permanent magnet. Around the polar extension e' of this magnet are placed two separate coils A' and C', and around polar extension e^2 are placed two separate coils A'' C'', these four
30 coils having the same resistance.

d designates the main-line circuit, which traverses coils C' C'' and passes out to ground or to a metallic connection. Placed between the polar extensions e' e^2 is a fork F, rigidly
35 supported at f , so as to have a definite normal position, with its tines disposed at equal distances in front of the said extensions. The fork F is made of soft iron.

40 h , h' , h^2 , and h^3 are arms or supports arranged in pairs, the members of each pair being insulated from each other, as shown at i i' .

The arms h and h' are secured to one tine of the fork F by means of insulating-bushing k , and the arms h^2 and h^3 are secured to the
45 other tine by means of an insulating-bushing k' . To the arms h and h' , respectively, are secured carbon disks m and m' , and to the arms h^2 and h^3 , respectively, are attached carbon disks m^2 and m^3 , the whole constituting a part of a microphone system, the
50 disks m and m' being in contact, respectively, with the disks m^2 and m^3 .

Secured to the arms h' and h^3 by suitable binding-posts are the terminals of a local circuit m from a battery p . This circuit is connected with the primary of an induction-coil P, the secondary of which coil is in the circuit o , which traverses the coils A' and A'', surrounding the polar extensions e' and e^2 , respectively. The disks m and m^2 , through
55 their arms h and h^2 , are included in the circuit r of a local battery n . The wires of this circuit are connected to the primary of an induction-coil R, the secondary of which coil is included within a local or trunk line S, which
60 includes a receiver s .

The method of reinforcing the magnetic effect of the main-line current is as follows: Pulsations of current from the main line d in the magnet-coils C' C'' cause the vibration of
70 the two arms of the fork F in equal and opposite directions, thereby varying the pressure between the microphonic disks m' and m^3 and m and m^2 . The local circuit from the battery p passing through the disks m' m^3
75 is caused to pulsate in unison with the pulsations of the main line, thereby causing similar pulsations in the circuit o , which traverses the coils A' A'', producing a magnetic effect upon the coils e' e^2 , which reinforces the magnetic
80 effect of the pulsations in the main line. The local or outgoing circuit from the battery n passes through the disks m m^2 and its current is caused to pulsate by the varying pressure between said disks and in unison with
85 the pulsations in the main line. Through the induction-coil R this current will cause similar pulsations in the outgoing line S, which line includes the receiver s .

From the above it will be seen that the essence of my invention is the reinforcement of
90 the weak magnetic effect of the current from the main line by a current from a local battery having pulsations of the same kind as the pulsations of the main line, the current
95 from the local battery being caused to influence the same magnet as the current from the main line. By reason of the instantaneous character of the induced current from the coil P there is no retardation and no confusion of sound at the receiver.
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While I have referred to the circuit d as the main line, it will of course be readily understood that it is a line from the transmitter

and that the receiver *s* is included in the outgoing circuit *r* and that the circuit *d* performs no other work than to cause variations of pressure in the microphone.

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

1. In the art of telephony the method of reinforcing the effect of the main-line current upon microphone-contacts by causing variations of current in a local circuit which influences the main-line magnet independently of the main line, to correspond with the variations of current in the main line.

2. In the art of telephony, the method of reinforcing the effect of the main-line current upon microphone-contacts by causing pulsations from a local battery, similar in kind to the pulsations of the main line, to influence the main-line magnet independently of the main line.

3. In the art of telephony the method of reinforcing the effect of the main-line current upon microphone-contacts by causing pulsations from the main-line circuit to produce pulsations of the same kind in a local circuit which influences the main-line magnet independently of the main line, substantially as described.

4. In the art of telephony the method of reinforcing the effect of the main-line current upon microphone-contacts by causing electrical pulsations of higher potential but of the same form as the pulsations of the main line, to influence the main-line magnet independently of the main line.

5. In the art of telephony the herein-described method of reinforcing the effect of the

main-line current by causing variations of pressure in a microphone produced by the main-line current, to produce in a local circuit which influences the main-line magnet independently of the main line; pulsations of the same kind as the pulsations of the main line, but of higher potential.

6. In the art of telephony the herein-described method which consists in causing variations of pressure in a microphone produced by the main-line current, to produce in a local circuit which influences the main-line magnet independently of the main line, pulsations of a similar character to those of the main line, and causing the increased variations of pressure so produced in said microphone to influence an outgoing circuit which includes the receiver.

7. In the art of telephony the herein-described method which consist in causing variations of pressure in a microphone produced by the main-line current, to produce in a separate and independent circuit connected to the primary of an induction-coil the secondary of which coil influences the main-line magnet, pulsations of a similar character to those of the main line, and causing the increased variations of pressure so produced in said microphone to influence an independent outgoing circuit which includes the receiver.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE A. CARDWELL.

Witnesses:

GEO. E. CRUSE,

CHARLES S. JONES.