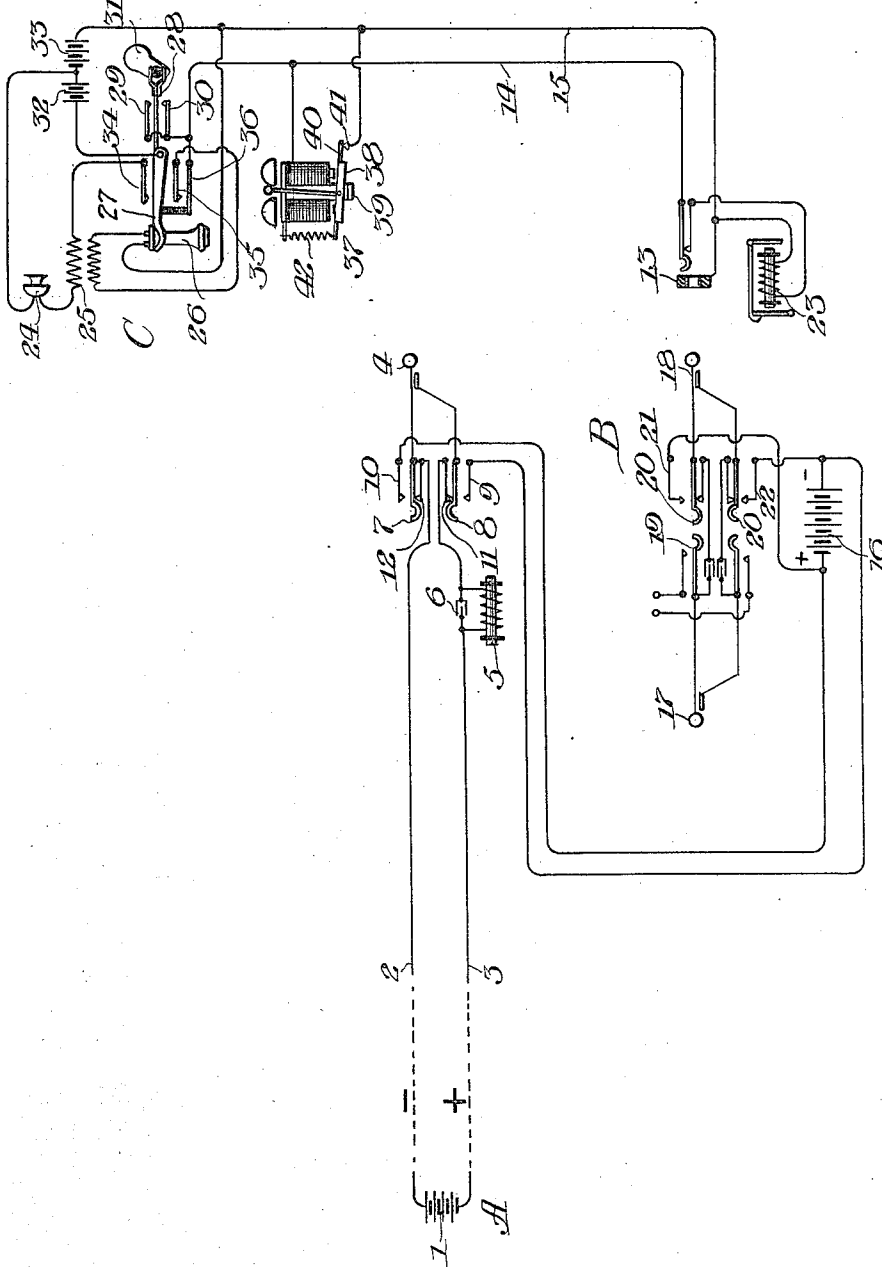


O. M. LEICH.
TELEPHONE SYSTEM.
APPLICATION FILED MAR. 27, 1911.

1,063,361.

Patented June 3, 1913.



Witnesses
O. M. Leich
Hazel Jones.

Inventor
Oscar M. Leich
by May W. Zabel
att'y

UNITED STATES PATENT OFFICE.

OSCAR M. LEICH, OF GENOA, ILLINOIS, ASSIGNOR TO CRACRAFT, LEICH ELECTRIC COMPANY, OF GENOA, ILLINOIS.

TELEPHONE SYSTEM.

1,063,361.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed March 27, 1911. Serial No. 617,136.

To all whom it may concern:

Be it known that I, OSCAR M. LEICH, a citizen of the United States, residing at Genoa, in the county of Dekalb 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 in particular to the signaling appliances associated with such systems.

My invention contemplates the use of a link circuit at an exchange which through the agency of a direct current source, when connected with a subscriber's telephone, normally establishes and maintains an electric potential on the line wires of the circuit of a given pre-determined polarity so that throughout the exchange the so called tip wires, for instance, may be negative and the sleeve positive.

My invention here contemplates the use at the subscriber's station of a vibratory contact or similar signal receiving device which is operable only with current of a given polarity and not by current of the opposite polarity and so arranged and connected to the circuit that the polarity maintained by the central source of current will not operate said signal receiving device. Means are here provided in connection with the link circuit for establishing a reverse polarity on the line wires to thereby operate the signal receiving device and call the subscriber.

I will describe my invention more in detail by reference to the accompanying drawing illustrating diagrammatically one form of carrying out my invention.

In this drawing I show the system as applied to a central energy exchange in combination with a private branch exchange, to which private branch exchange the particular subscriber's circuit described herein is connected. It will of course be apparent, however, from the description that many changes may be made and the apparatus used without the intervention of the additional exchange as may be desired. I use the words "central energy" herein and in the claims to signify a common source of current for utilization in the talking cir-

cuits, which common source may, of course, be the ordinary secondary battery or some other source as may be found to serve the purpose.

In the drawing the central energy source is shown as a common battery. I illustrate for purposes of showing my invention as applicable for use in connection with a central energy exchange and a branch exchange, a central energy exchange A, a branch exchange B and a subscriber's station C. I have omitted all of the apparatus at the common battery exchange A except the common battery 1 which is connected through intermediate apparatus, as illustrated in my co-pending application, Serial No. 617,135, filed March 27, 1911, by means of two conductors 2 and 3 forming a trunk circuit to a link circuit ending in a plug 4. A coil 5 bridged by a condenser 6 maintains metallic continuity of the trunk line circuit. I have not illustrated the listening key and clearing out features as they do not form part of the invention. I do, however, illustrate a ringing key having the springs 7 and 8 and the ringing contacts 9 and 10. Back contacts 11 and 12 maintain the continuity of the circuit normally through the ringing key. The ringing key, the coil 5 and the plug 4 are at the branch exchange B where said link circuit is adapted for connection with a jack 13 illustrative of the jacks utilized for each subscriber's line, which jack 13 connects by means of the conductors 14 and 15 with the instrument at the subscriber's station C. At the branch exchange I also illustrate a local source of current here illustrated as a primary battery 16 which is connected with the ringing contacts 9 and 10 to provide preferably direct current to operate the substation signal receiving device. It will be seen that the battery 1 establishes a potential in the link trunk circuit in such a manner that the tip of the plug is negative and the sleeve positive. Now when the ringing springs 7 and 8 are actuated the current from the battery 16 establishes a potential in the trunk link circuit so that the tip is positive and the sleeve negative. At the branch exchange there is also a local link circuit comprising the plugs 17 and 18, the listening key 19, ringing springs 20, 20, together with ringing contacts 21 and 22, contact 21

being connected to the positive side of the battery 16 and contact 22 to the negative side so that during the signal sending operation the local link circuit is so wired that the tip of the plug 18 is positive and the sleeve negative which is exactly the same polarity established in the plug 4 when the springs 7 and 8 are actuated.

The local signal at the substation C is designed for operation by current of a given polarity and this signal is so arranged that the polarity established in the conductors 14 and 15 when the trunk link circuit is connected therewith by the common battery 1, will not operate said signal, but when the ringing key of the trunk link circuit is actuated the polarity impressed on the line wires 14 and 15 is reversed so that conductor 14 is positive and conductor 15 negative, and thereupon the local signal will operate. The same is true of the local link circuit which establishes a positive polarity in the conductor 14 and a negative polarity in the conductor 15 when the ringing key of said local link circuit is actuated.

At the branch exchange the jack 13 is united with a drop 23 as will be well understood. At the subscriber's station C I use an automatic signal sending circuit as set forth more clearly in my co-pending application Serial No. 561,651, filed May 16, 1910. This local subscriber's station includes the transmitter 24, induction coil 25, receiver 26, switchhook lever 27, signal sending springs 28, 29 and 30 and a controlling weight 31 together with the transmitter battery 32 and auxiliary signal sending battery 33. This switchhook is further provided with springs 34, 35 and 36. The talking circuit will be readily understood from the connections and the signaling springs 28, 29 and 30 automatically operate the drop 23 when the receiver is removed in accordance with my said co-pending application. I combine with this novel substation circuit my signal receiving device 37 which has a polarized armature 38 polarized by the magnet 39. The armature 38 has a spring contact 40 acting in conjunction with a back contact 41. A spring 42 normally maintains the armature in its contact making position and on account of the polarized nature of the signal receiving device 37 prevents it from being operated by currents of any other than a given pre-determined polarity. Thus, for instance, the polarity of the current established in the conductors 14 and 15 by the common battery 1 will not cause the actuation of the signal receiving device 37, but the polarity of the current established in these conductors when the ringing keys of either the link circuits are actuated, causes an operation of said signal receiving device. The coils of the said signal receiving device are serially associated with the

contact spring 40 and contact 41, the signal in this instance being of the vibratory contact variety.

While I have herein shown and specifically described one form of carrying out my invention, I do not mean to limit myself to the specific description herein set forth, but

Having thus described the preferred embodiment of my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, normally establishing during operative conditions a pre-determined polarity, throughout the conductors of said trunk circuit, a branch exchange, a source of current thereat, a subscriber's instrument having a signal receiving device, means associated with said receiving device whereby it is responsive to currents of one polarity only, and means associated with said trunk circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source.

2. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, a branch exchange, a source of current thereat, a subscriber's instrument having a signal receiving device, means associated with said receiving device whereby it is responsive to currents of one polarity only, and means associated with said trunk circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source.

3. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, normally establishing during operative conditions a pre-determined polarity throughout the conductors of said trunk circuit, a branch exchange, a source of current thereat, a subscriber's instrument having a signal receiving device responsive to currents of one polarity only, and means associated with said trunk circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source.

4. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, a branch exchange, a source of current thereat, a subscriber's instrument having a signal receiving device responsive to currents of one polarity only, and means associated with said trunk circuit to impress current from said second source on said signal receiving device to operate same, of a

reverse polarity to that impressed by said first aforesaid source.

5 5. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, normally establishing during operative conditions a pre-determined polarity throughout the conductors of said trunk circuit, a branch exchange, a source of current
10 thereat, a subscriber's instrument having a vibratory contact signal receiving device, means associated with said receiving device whereby it is responsive to currents of one polarity only, and means associated with
15 said trunk circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source.

20 6. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, a branch exchange, a source of current thereat, a subscriber's instrument having a vibratory contact signal receiving device, means associated with said receiving device whereby it is responsive to currents of one polarity only, and means associated with said trunk circuit to impress currents
25 from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source.

30 7. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, normally establishing during operative conditions a pre-determined polarity throughout the conductors of said trunk circuit, a branch exchange, a source of current thereat, a subscriber's instrument having a vibratory contact signal receiving device responsive to currents of one polarity only, and means associated with said trunk
40 circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source.

45 8. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk

circuit, a branch exchange, a source of current thereat, a subscriber's instrument having a vibratory contact signal receiving device responsive to currents of one polarity only, and means associated with said trunk circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source. 55 60

9. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, normally establishing during operative conditions a pre-determined polarity throughout the conductors of said trunk circuit, a branch exchange, a source of current thereat, a local link circuit thereat, a subscriber's instrument having a signal receiving device, means associated with said receiving device whereby it is responsive to currents of one polarity only, and means associated with said trunk circuit and said link circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source. 65 70 75

10. The combination with a trunk circuit from a central energy exchange, a source of current at the exchange end of said trunk circuit, normally establishing during operative conditions a pre-determined polarity throughout the conductors of said trunk circuit, a branch exchange, a source of current thereat, a local link circuit thereat, a subscriber's instrument having a vibratory contact signal receiving device, means associated with said receiving device whereby it is responsive to currents of one polarity only, and means associated with said trunk circuit and said link circuit to impress current from said second source on said signal receiving device to operate same, of a reverse polarity to that impressed by said first aforesaid source. 80 85 90 95

In witness whereof, I hereunto subscribe my name this 18th day of March A. D., 1911.

OSCAR M. LEICH.

Witnesses:

HAZEL JONES,
O. M. WERMICH.