

No. 692,250.

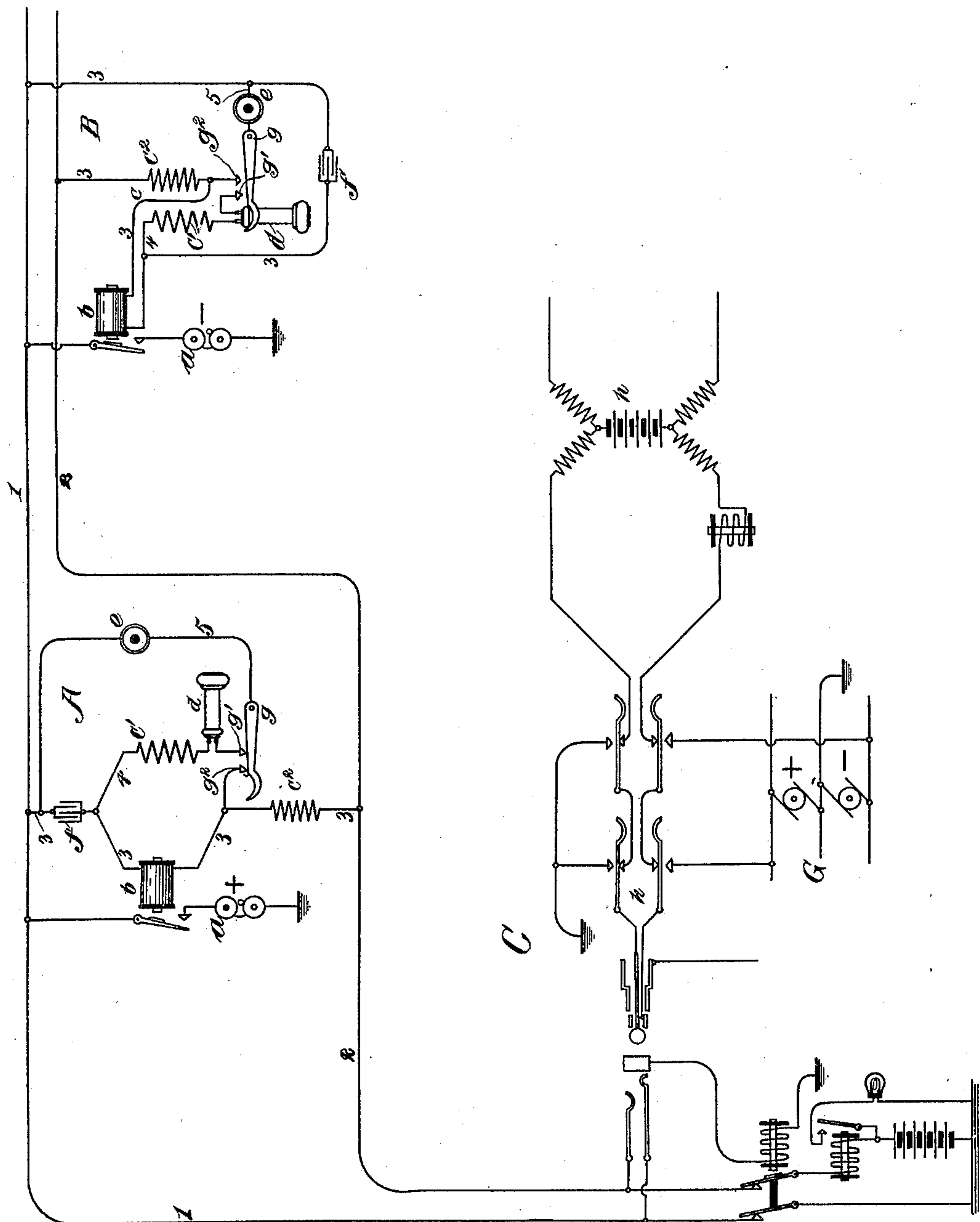
Patented Feb. 4, 1902.

W. W. DEAN.

CALLING APPARATUS FOR TELEPHONE LINES.

(Application filed May 31, 1900.)

(No Model.)



Witnesses:  
J. M. Skinkler,  
W. H. Leach

Inventor:  
William W. Dean,  
By *George A. Barton*,  
Attorney.

# UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## CALLING APPARATUS FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 692,250, dated February 4, 1902.

Application filed May 31, 1900. Serial No. 18,493. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. DEAN, 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 Calling Apparatus for Telephone-Lines, (Case No. 32,) of which the following is a full, clear, concise, and exact description.

My invention relates to party telephone-lines; and its object is to provide improved circuits and apparatus whereby the subscribers' call-bells may be selectively operated although placed in grounded branches which contain induction devices normally insulating the line conductors from the earth with respect to direct currents.

In modern telephone engineering practice where the central-battery system is employed a condenser is frequently used at each substation with a peculiar arrangement of the telephone talking apparatus. The condenser acts as a secondary source of current to supply the primary transmitter-circuit, the condenser itself being charged by direct current transmitted over the line from a battery at the central office.

In party-line systems heretofore designed it has been usual to provide call-bells of high resistance adapted to respond to pulsating currents of a given polarity in grounded branches from the line conductors; but in modern telephone-exchanges where automatic signals are employed these grounded branches have interfered with the operation of the signals. To prevent this, it has been attempted to include the condenser in the grounded branch which contains the call-bell; but it has been found that the call-bells cannot be rung satisfactorily through the condenser, because the condenser alters the character of the current from pulsating to alternating. It has been proposed, therefore, to provide a relay at each station included with a condenser in a bridge of the line and to connect the call-bell at each station in a normally open ground branch from one limb of the line, adapted to be closed by the switch-contacts of the relay, which is responsive to the pulsating ringing-current. My invention is an improvement

on this system and lies in a peculiar arrangement of apparatus and circuits, such that the relay may be successfully used without being liable to accidental operation, my object being in particular to prevent the relay from being actuated by the direct current, which is supplied to the line for talking purposes. To this end I associate the relay with the other apparatus in such a way that it will be with the condenser in a bridge of the line to respond to calling-current, but will be short-circuited and out of the path of direct current when the telephone is removed from its switch.

I will describe my invention particularly by reference to the accompanying drawing, which is a diagram of a party telephone-line extending from two substations to a central office, with a portion of the central-office apparatus for making connection with the line.

The substation A is illustrated in a somewhat different manner from the substation B; but it will be seen that the circuits are exactly the same. The signal-bell *a* at the substation is connected in a grounded branch from one limb of the telephone-line normally open at the switch-contacts of a relay *b* and adapted to be closed by said relay when excited. The relay *b* is connected in a bridge across the line, which also includes serially the condenser *f* and a secondary winding *c*<sup>2</sup> of the induction-coil *c*. The said winding *c*<sup>2</sup> also forms part of a bridge-circuit 3 5, containing the microphone-transmitter *e*, this last-mentioned bridge being controlled at the contact *g*<sup>2</sup> of the telephone-switch *g*, which is interposed between the induction-coil winding and the transmitter. The telephone-switch is also provided with a contact *g*<sup>1</sup>, which forms the terminal of a shunt-wire 4, extending to the aforesaid bridge-wire 3 and connected thereto at a point between the condenser *f* and the relay *b*. This wire 4 includes the receiving-telephone *d* and the other winding *c*<sup>1</sup> of the induction-coil. The wire 4, with the apparatus included therein, is thus in shunt of the relay *b*, and, together with the condenser *f*, is also in shunt of the transmitter *e*. The wire 5, containing the transmitter, shunts the relay and the con-



denser. The relay *b* is thus in a permanently-closed conductor which extends from a point between the induction-coil winding *c*<sup>2</sup> and the switch *g* to the condenser *f*—that is, it is included with the condenser in a bridge of the line; but the relay is removed from the path of direct current, since when the telephone is off the hook, as shown at substation A, the contacts *g'* *g*<sup>2</sup> are electrically united and the relay is short-circuited by the switch-lever. During connection with the line current is applied thereto from the central battery *h*, which is bridged across the cord-circuit used in establishing the connection. This direct current flowing out over the line charges the condenser *f*, which acts as a secondary source of current in the local circuit 4 5, including the transmitting and receiving telephones and the winding *c'* of the induction-coil. The relay *b*, however, will be unaffected, because the direct current takes the path 3 5.

When it is necessary to ring the bell *a* at station A, pulsating current of proper sign from the ringing-generator G at the central office may be sent out over the limb 1 of the line with which the bell is connected by depressing the ringing-key *k*, which also connects the other limb 2 of the line to earth. The pulsating current flows through the bridges 3 at all the stations, the relays *b* at all the stations being operated thereby. The bells *a*, however, are polarized, so that each responds only to current of a given polarity. For instance, the bell at station A may respond only to positive current, while the bell at station B responds only to negative current. When positive calling-current is applied to limb 1 of the telephone-line, therefore, the bell at station A only will be rung.

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

1. The combination with a telephone-line and means for producing current therein, of a bridge of the line having a winding of an induction-coil, a relay and a condenser included serially therein, a telephone-switch and a shunt of the relay and condenser controlled thereby, said shunt including a transmitting-telephone, and a circuit controlled by the relay, as described.

2. The combination with a telephone-line and means for directing current over the line, of a call-bell at the substation thereof and a branch circuit including said call-bell, a relay controlling said branch circuit, transmitting and receiving telephones, an induction-coil having two windings, a permanently-closed bridge of the line including serially the condenser, the relay and a winding of the induction-coil, two shunt-conductors, one of said conductors shunting the relay and including the other winding of the induction-

coil, and the other conductor including the transmitting-telephone shunting the condenser and relay, and a switch controlling said shunts, substantially as set forth.

3. The combination with a telephone-line and means for directing calling-current and steady current over the line, of a bridge of the line including serially a telephone-transmitter and one winding of an induction-coil, a telephone-switch controlling said bridge, having its contacts between the transmitter and the said induction-coil winding, a shunt of the transmitter including serially a condenser, another winding of the induction-coil and a receiving-telephone, said shunt being also controlled by the telephone-switch, a signal-bell, a branch circuit from one limb of the line including said signal-bell, a relay controlling said branch circuit, responsive to calling-current, and a permanently-closed conductor including said relay, extending from a point between the first-mentioned winding of the induction-coil and the telephone-switch, in bridge of the line through the condenser, whereby the relay is in the path of calling-current but is short-circuited as to direct current.

4. The combination with a telephone-line and means for directing calling-current and direct current over the line, a call-bell connected by a branch conductor to one limb of the telephone-line at the substation thereof, a relay *b* controlling the connection of the bell with the line, a transmitting-telephone and a receiving-telephone, a switch-lever *g* connected with a limb 1 of the line through the transmitting-telephone, two contacts *g'* *g*<sup>2</sup> for the switch-lever normally separated from one another and from the switch-lever, but adapted to be closed together against the switch-lever when the telephone talking apparatus is in use, a winding *c*<sup>2</sup> of an induction-coil included in a conductor extending from the contact *g*<sup>2</sup> to the other limb 2 of the telephone-line, a conductor extending from the limb 1 of the telephone-line to the other contact *g'* of the switch-lever and including serially a condenser and the other winding *c'* of the induction-coil, the condenser being between the said winding *c'* and the limb 1 of the telephone-line, and a conductor including the helix of the relay *b*, said conductor extending between the condenser and the contact *g*<sup>2</sup> of the switch-lever, whereby the relay is included with the condenser in a bridge of the line, to respond to calling-current, and is removed from the path of the direct current, substantially as set forth.

In witness whereof I hereunto subscribe my name this 8th day of January, A. D. 1900.

WILLIAM W. DEAN.

Witnesses:

DE WITT C. TANNER,  
JAY W. SKINKLE.