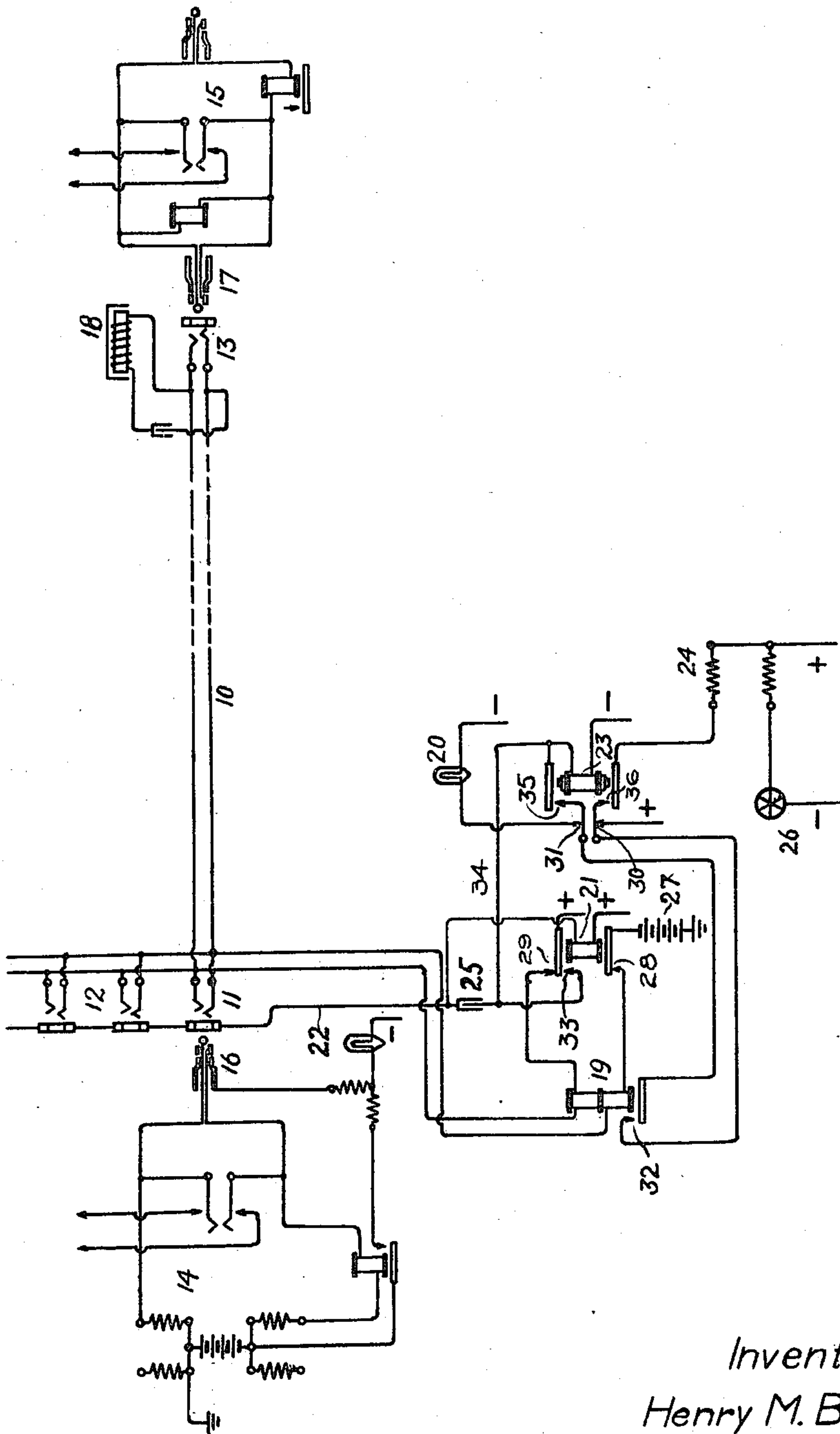


H. M. BASCOM.
 SIGNALING SYSTEM.
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1,211,044.

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UNITED STATES PATENT OFFICE.

HENRY M. BASCOM, OF BROOKLYN, NEW YORK, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

SIGNALING SYSTEM.

1,211,044.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY M. BASCOM, residing at Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Signaling Systems, of which the following is a specification.

This invention relates to telephone signaling systems. More especially it concerns the line signals associated at central stations with trunk lines leading to private branch exchanges. The manner in which private branch exchange operators commonly perform their duties tends to delay the central station operators, and in districts including many private branch exchanges the drag upon the work of the central station operators may become excessive. A conspicuous instance of this is found in connection with the failure of the operator promptly to take down the connection at the private branch exchange after the A-operator at the central station has disconnected. While the plug is in the trunk jack at the private branch exchange, it will cause the line lamp for the trunk at the central station to relight. To avoid mistaking this display of the signal for a new call the A-operator must hold the trunk by leaving the plug in the jack, this increasing the burden upon the operator. Confusion is also liable to result through the central station operators treating the trunk as though it were idle in the normal way and connecting with it at the multiple jacks.

The object of my invention is to provide means dependent upon this particular order of operation, that is, the withdrawal of the plug from the trunk jack at the central station before the corresponding operation at the private branch exchange, for rendering the line signal ineffective, and for producing at the test terminals of the trunk at the central station a condition indicating the character of the connection thereto.

The accompanying drawing shows diagrammatically a single embodiment of the invention.

A trunk line 10 extends from the answering jack 11 and multiple jacks 12 at a central station switchboard to a jack 13 at a private branch exchange switchboard. At the central station and private branch exchange are the usual cord circuits 14 and 15, respectively, but a portion of each of which is shown, these having plugs 16 and 17 for

coöperation with the jacks 11, 12 and 13 for the purpose of effecting the connection of the trunk 10 with other lines and its disconnection therefrom. Associated with the private branch exchange end of the trunk is the customary equipment 18, while at the central station is the usual line relay 19 controlling at its front contact the line lamp 20, and a cutoff relay 21 with its winding included in the local conductor 22 of the trunk. The cutoff relay is provided with a front contact controlling the energization of a slow release relay 23, which when operated disconnects the line lamp from the contact of the line relay and at its front contacts joins to the conductor 22, through a transformer 24 and a condenser 25, an interrupter 26 or other source of audible signals.

In the operation of the system, upon a call coming into the central station over the trunk 10, the line relay 19 is energized by current from battery 27 traversing back contact 28 of cutoff relay 21, lower winding of relay 19, ring side of the trunk 10, ring contacts of the jack 13 and plug 17 at the private branch exchange, cord 15, tip contacts of plug 17 and jack 13, tip side of the trunk, upper winding of relay 19 and contact 29 of the cutoff relay. The line relay is thus energized and lights the line lamp 20 through back contacts 30 and 31 of relay 23 and its own front contact 32. The A-operator at the central station answers by inserting the plug 16 in the jack 11. The cutoff relay 21 thereupon receives current from battery in the cord 14 by way of the sleeve contacts of plug 16 and jack 11 and the conductor 22, and by opening contacts 28 and 29 releases the line relay which breaks its contact 32 to cause the withdrawal of the line signal. At contact 33 the cutoff relay completes a circuit for relay 23 through conductor 34. Back contacts 30 and 31 in the circuit of the line lamp are opened by the operation of relay 23 and at the front contacts 35 and 36 there are respectively joined to the armature of relay 19 and the contact 32, the winding of relay 23 and the secondary of the transformer 24. The connection is completed at the central office and the conversation proceeds. At its close, if the private branch exchange operator first withdraws the plug 17 from the jack 13, there is no change in the trunk equipment at the central station until the A-operator removes the

plug 16, which releases the cutoff relay 21. This in turn deenergizes the relay 23, restoring this portion of the system to its normal condition. If, however, the A-operator is the first to disconnect, the cutoff relay is deenergized, and upon the closure of its back contacts 28 and 29, the line relay is at once energized over the trunk by means of the circuit first traced. Before the slow release relay has time to release, as a result of the opening of contact 33 of the cutoff relay which is in its original circuit, a locking circuit is completed for it by contact 32 of the line relay and including its contacts 35 and 36 and the secondary winding of the transformer 24. Relay 23 therefore holds the circuit of the lamp 20 open in spite of the closure of the break at the front contact of the line relay, so that the line signal is not again displayed. A characteristic tone potential is impressed upon the sleeve contacts of the jacks 11 and 12 by the interrupter 26 and the primary of transformer 24 through the secondary of said transformer, relay contacts 36, 32 and 35, condenser 25 and conductor 22. The central station operators testing the multiple jacks 12 of the trunk hear this tone and understand the condition of the trunk. When it comes to the attention of the private branch exchange operator that she has failed to disconnect, she withdraws the plug 17 opening the circuit of the line relay 19. This by breaking contact 32 severs the locking circuit of relay 23, and the trunk equipment is again normal.

I claim:

1. In a telephone system, a central station and a private branch exchange station, a trunk line extending between the stations, connecting circuits for cooperation with the trunk at both stations, a line signal displayed when the private branch exchange connecting circuit is joined to the trunk, means for causing the withdrawal of said signal upon the connection of the central station circuit with the trunk, and means situated at the central station for preventing the signal from being again displayed when the central station circuit is disconnected from the trunk before the disconnection of the private branch exchange circuit.

2. The combination with a telephone line, of a line relay, a signal controlled thereby, a cutoff relay, and a slow release relay governed by the cutoff relay for removing the signal from the control of the line relay.

3. The combination with a telephone line, of a line relay, a signal controlled thereby, a cutoff relay, a slow release relay for disconnecting the signal from the line relay, an energizing circuit for the slow release relay including a front contact of the cutoff relay, and a locking circuit for the slow release relay extending through a front contact of the line relay.

4. The combination with a telephone line, of switching means for connecting with and disconnecting from opposite extremities of the line, and means for producing an audible signal upon the line dependent upon the disconnection of the switching means in a particular order.

5. In a telephone system, two stations, a line joining the stations and having a conductor local to a station, switching means cooperating with the line at both stations, and means for producing a signal upon the local conductor of the line at one of the stations dependent upon the disconnection of the switching means in a particular order.

6. In a telephone system, two stations, a line joining the stations and having a conductor local to a station, switching means cooperating with the line at both stations, and means for producing an audible signal upon the local conductor of the line at one of the stations upon the disconnection of the switching means at that station before the disconnection of the switching means at the distant station.

7. In a telephone system, a central station and a private branch exchange station, a trunk line extending between the stations and having a local conductor at the central station, connecting circuits for cooperation with the trunk at both stations, and means for producing an audible signal upon said local conductor of the trunk at the central station upon the disconnection of the connecting circuit at said station before disconnection at the private branch exchange.

8. The combination with a telephone line, of a line relay, a signal controlled thereby, a cutoff relay, a slow release relay governed by the cutoff relay, and a source of potential associated with the line by the slow release relay.

9. The combination with a telephone line, of switching means for connecting with and disconnecting from opposite extremities of the line, a visual signal associated with the line, means governed by the line switching means for causing the display of said signal, an audible signal, and means dependent for its operation upon the order of operation of the line switching means for rendering the visual signal ineffective and for associating the audible signal with the line.

10. In a telephone system, a central station and a private branch exchange station, a trunk line extending between the stations, connecting circuits for cooperation with the trunk at both stations, a line signal displayed when the private branch exchange connecting circuit is joined to the trunk, means for causing the withdrawal of said signal upon the connection of the central station circuit with the trunk, means situated at the central station for preventing the signal from being again displayed when

the central station circuit is disconnected from the trunk before the disconnection of the private branch exchange circuit, and means for producing in the trunk a condition indicating the character of the connection thereto.

11. The combination with a telephone line, of a line relay, a line lamp controlled thereby, a cutoff relay, a source of potential, and a relay governed by the cutoff relay for removing the line lamp from the control of

the line relay and for associating the source of potential with the line.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this first day of September, 1915.

HENRY M. BASCOM.

Witnesses:

ERNEST W. UNAUGST,
J. WILLIS HINES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."