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TELEPHONE SYSTEM

Filed Jan. 18, 1932

FIG. 1

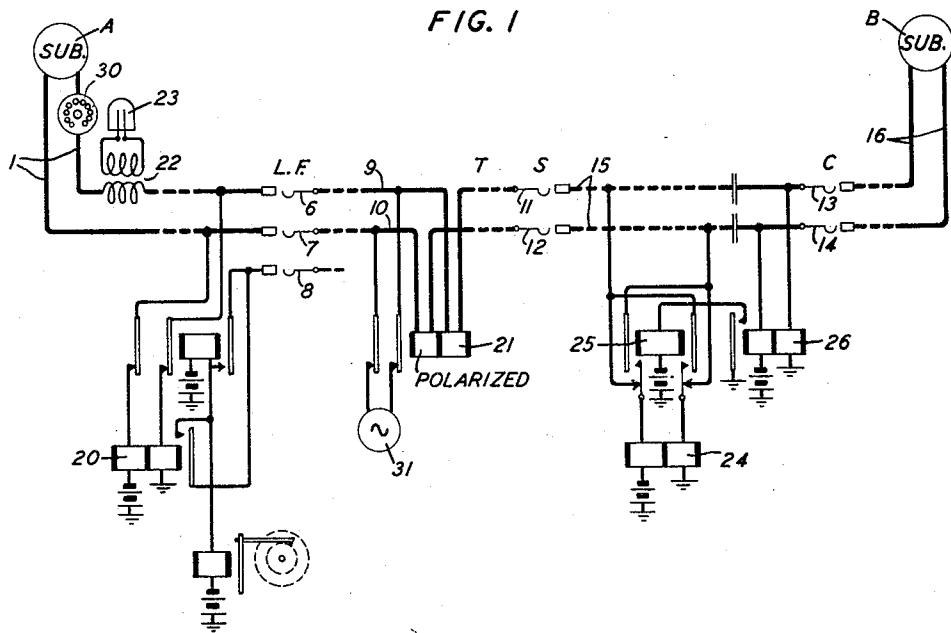
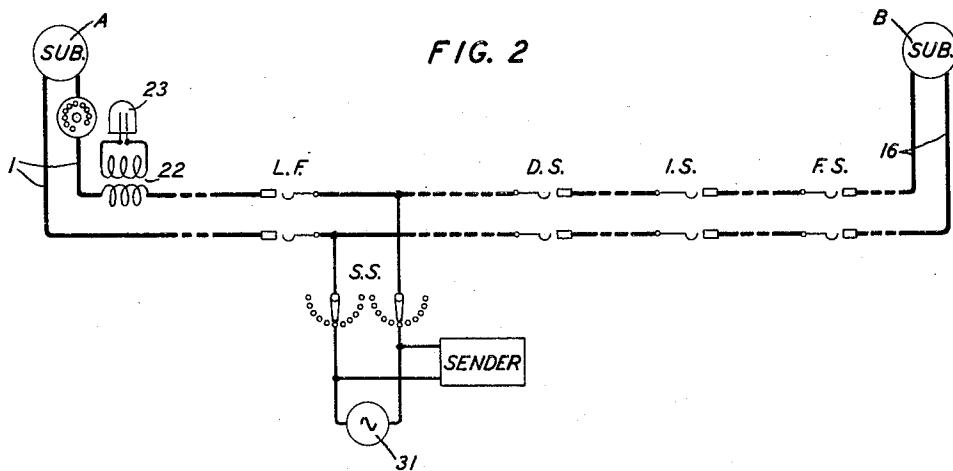


FIG. 2



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TELEPHONE SYSTEM

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This invention relates in general to dial telephone systems and particularly to the illumination of the characters of the impulse senders employed in such systems.

5 In order to minimize the probability of telephone connections being inaccurately established by a subscriber manipulating the impulse sender or calling dial in dimly lighted rooms, telephone booths and the like, it
 10 has been suggested in the past that some means be provided for rendering the dial characters more readily discernible. Treating the dial characters with phosphorescent paint, placing a lamp in proximity with the
 15 dial, incorporating in the dial structure a translucent number plate beneath which a small lamp may be lighted constitute some of the suggestions proposed in the past. In cases where auxiliary lamps were proposed,
 20 means were provided for placing the lamps under the control of the telephone receiver switchhook contacts to be lighted in a local circuit when the receiver was removed from its switchbook.
 25 It is the object of this invention to improve the method of controlling the illumination of telephone calling dials.

This object is attained in accordance with a feature of the invention by employing a
 30 glow discharge tube in the form of a neon lamp, suitably associated with the dial structure and operated by carrier frequency current from the central office.

Another feature of the invention resides
 35 in the use of the neon lamp, not only as a means for illuminating the dial, but also as a dialing signal to visually indicate to the calling subscriber when she may actuate the dial in establishing a telephone connection.

40 These and other features of the invention will be readily understood from the following detailed description made with reference to the accompanying drawing in which Fig. 1 is a somewhat skeletonized circuit diagram
 45 of an automatic telephone connection of the step-by-step type embodying the features of the invention and Fig. 2 is a schematic diagram of an automatic telephone connection of the panel type embodying the features of
 50 the invention.

Referring to Fig. 1, A represents a calling subscriber's station connected by the line 1 to the bank of a line finder switch LF which is represented by the brushes 6, 7 and 8. The line finder is connected by the tip and ring conductors 9 and 10 of the trunk T to an associated selector switch S which is represented by the brushes 11 and 12. The brushes 13 and 14 represent a connector switch C which is connected by the trunk 15 to the terminals with which the brushes of the selector S are in contact. The line 16 connects the terminals with which the brushes 13 and 14 are in contact, to the called subscriber's station B. 65

The line finder LF is similar to that disclosed in United States Patent No. 1,711,682 issued to Hovland, May 7, 1929. The selector switch S and connector switch C are of the Strowger type; for a detailed description of their operation, reference may be had to pages 57 to 65 inclusive of the second edition of "Automatic Telephony" by Smith and Campbell. Only those portions of the various switches are shown as are required 75 in explaining the operation of systems in which this invention is embodied.

When a call is originated by the removal of the receiver from the receiver hook at the calling station A, the line relay 20 operates 80 in the well known manner, thereby causing a linefinder switch, such as LF, to hunt for the calling line 1. When the linefinder LF has found the calling line, the brushes 6, 7 and 8 will engage and remain in engagement 85 with corresponding terminals of the calling line 1.

At this point in the connection, it is usual practice to cause a tone signal to be transmitted over the line 1 to inform the calling subscriber that the linefinder has found the calling line and that the connection is ready for the reception of dial pulses. Upon hearing this tone signal, the calling subscriber proceeds to actuate the calling dial 30 to 90 transmit pulses in accordance with the number of the line with which telephone connection is desired. It is common practice for the calling subscriber to dial immediately 95 after removing the receiver from the switch- 100

hook without listening for the tone signal. Such a procedure may result in the loss of pulses and the establishment of a wrong connection.

5 It will be noted that a source 31 of carrier current is normally associated with the trunk T by way of the armatures and front contacts of polarized relay 21, so that when the trunk T is connected to the subscriber's line 1, carrier current from the source 31 will traverse a path including the back contacts and armatures of relay 21, trunk conductors 9 and 10, brushes 6 and 7 of linefinder LF and their associated line terminals, primary 15 winding of transformer 22 and through the subscriber's substation equipment at station A. A neon lamp 23 is bridged across the secondary winding of the transformer 22 and is energized accordingly, by current from the 20 source 31. The illumination of lamp 23 thereupon indicates to the calling subscriber that she may proceed to dial.

In order that the lamp 23 may also serve to illuminate the dial, it is suggested that the 25 lamp be made of toroidal shape which will permit the use of standard dials with a minimum number of changes in design and will provide for uniform illumination of all the dial characters. The lamp may be located 30 between the plate carrying dial characters and the mechanism of the dial. The characters may be stamped on a translucent material supported by a metal plate with perforations in it corresponding to the location 35 of the characters to permit them to be illuminated from the rear.

The lamp 23 is shown connected with a step-up transformer in order to provide sufficient voltage for proper operation.

40 From the foregoing description, it is evident that this invention provides not only a satisfactory method of illuminating a telephone calling dial but also furnishes a visual signal, which is more conveniently recognized than an aural signal, as a dialing signal.

Upon receipt of the visual signal effected by the illumination of neon lamp 23, the subscriber proceeds to dial the desired number 50 and the selector switch S and connector switch C function in the well known manner in response to the transmitted impulses to complete the connection to the called station B.

55 It will be noted that up until this time, the polarized relay 21 remains unoperated as it is poled in such a manner that current from the battery connected to the connector circuit by way of the windings of relay 24 and normal contacts of relay 25 does not cause it to operate.

The called subscriber in responding to the incoming signal removes the receiver at station B whereupon relay 26 operates over an 65 obvious circuit and establishes an obvious

circuit for reversing relay 25 which operates. In operating, relay 25 reverses the leads from battery and ground associated with relay 24 to the tip and ring conductors of the established connection. This effects a reversal of current through polarized relay 21 which operates and removes the source 31 of carrier current from the trunk T. The lamp 23 is thereupon extinguished.

At the termination of conversation between the subscribers at stations A and B, the connection is released in the well known manner.

In Fig. 2 there is disclosed diagrammatically, one method of applying the present invention to a panel type system. In this figure, LF represents a linefinder, SS a sender selector, DS a district selector, IS an incoming selector and FS a final selector. These switches function in a well known manner and it is believed unnecessary to enter into any detailed description of their operation in this application. However, such a system is disclosed and described in U. S. Patent 1,567,072, issued to W. H. Matthies, December 29, 1925.

It is well known that in such panel type systems, the removal of the receiver at a calling station such as station A causes a sender selector switch to function to select an idle sender such as is diagrammatically shown at S and connect it with a linefinder such as LF which is hunting for the calling line. In this case, the source 31 of carrier frequency current is bridged across the sender conductors so that when the sender S is connected to the calling line 1 by way of linefinder LF and sender selector SS, carrier current from the source 31 will traverse the primary winding of transformer 22 over an obvious circuit and the lamp 23 will be energized to serve both as a dialing signal and as a means for illuminating the dial characters as hereinbefore described in connection with Fig. 1.

When the connection has been established to the called station by way of the district selector DS, incoming selector IS and final selector FS and the district selector has caused the talking connection to be established the sender S is dismissed in a manner well known to those skilled in the art. The disconnection of the sender also disconnects the current source 31 from the connection so that the lamp 23 is extinguished.

In both step-by-step and panel type systems, this invention provides for the transmission of a visual signal to indicate to the calling subscriber that the telephone equipment is prepared for dialing and also to illuminate the dial characters.

What is claimed is:

1. In a telephone system, a calling station, a dial at said calling station, an automatic switch controlled by the operation of said

dial, switching means responsive to the removal of the receiver at said calling station for connecting said station with said automatic switch, a visual signal at said calling station and means effective upon the connection of said automatic switch with said calling station for energizing said visual signal. 5

2. In a telephone system, a calling station, a dial at said calling station, an automatic switch controlled by the operation of said dial, switching means responsive to the removal of the receiver at said calling station for connecting said station with said automatic switch, a lamp at said calling station 10 and means effective upon the connection of said automatic switch with said calling station for causing said lamp to illuminate said dial and give a visual dialing signal.

3. In a telephone system, a calling station, a dial at said calling station, an automatic switch controlled by the operation of said dial, switching means responsive to the removal of the receiver at said calling station for connecting said station with said automatic switch, a visual signal at said calling station and a source of carrier current effective upon the connection of said automatic switch with said calling station for energizing said visual signal. 15

4. In a telephone system, a calling station, a called station, a dial at said calling station, a plurality of automatic switches controlled by said dial, switching means responsive to the removal of the receiver at said calling station for connecting said dial with the first of said automatic switches, a lamp located at said calling station, means effective upon the operation of said switching means for energizing said lamp and means effective upon the 20 response of the subscriber at said called station when said automatic switches have completed the connection between said called and calling stations under control of said dial, for extinguishing said lamp.

5. In a telephone system, a calling station, a lamp signal thereat, a link circuit, switching means responsive to the removal of the receiver at said calling station for connecting said station to said link circuit, and means effective upon the connection of said station with said link circuit for energizing said lamp signal. 25

6. In a telephone system, a calling station, a neon lamp signal thereat, a link circuit, a source of alternating current normally connected to said link circuit and switching means responsive to the removal of the receiver at said station for connecting said link circuit to said calling station to cause said neon lamp signal to be energized by current from said alternating current source. 30

7. In a telephone system, a calling station, a dial thereat, means for illuminating the characters of said dial, a link circuit, means responsive to the removal of the receiver at 35

said calling station for connecting said calling station to said link circuit and means effective upon the connection of said calling station to said link circuit for energizing said illuminating means. 70

8. In a telephone system, a calling station, a dial thereat, a neon lamp associated with said dial for illuminating the characters of said dial, a link circuit, a source of alternating current associated with said link circuit, switching means responsive to the removal of the receiver at said calling station for connecting said calling station to said link circuit whereupon current from said source energizes said neon lamp. 75

9. In a telephone system, a calling station, a dial thereat, means for illuminating the characters of said dial, a link circuit, means responsive to the removal of the receiver at said calling station for connecting said station with said link circuit, means responsive to the connection of said station with said link circuit for energizing said illuminating means, a plurality of automatic switches, a called station, said automatic switches being effective upon the actuation of said dial for extending a connection from said link circuit to said called station and means responsive to the removal of the receiver at said called station for causing the deenergization of said illuminating means. 80

10. In a telephone system, a calling line, a dial thereat, means for illuminating the characters of said dial, a link circuit, means responsive to the removal of the receiver on said calling line for connecting said line with said link circuit, a relay in said link circuit, a source of current connected to said link circuit by way of the contacts of said relay from which said illuminating means is energized when said calling line is connected to said link circuit, a called line, switching means responsive to the actuation of said dial for extending a connection from said link circuit to said called station and means at said called station for causing said relay to operate and disconnect said current source from said link circuit. 90

11. In a telephone system, a calling line, a dial associated therewith, a lamp for said dial, an automatic switch, means associated with said calling line for causing said automatic switch to hunt for and seize said calling line and means responsive to the seizure of said line by said switch for energizing said lamp to illuminate said dial. 100

In testimony whereof, I have signed my name to this specification this 15 day of January 1932. 110

HENRY M. BASCOM. 125