

July 24, 1934.

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1,967,404

SIGNALING APPARATUS

Filed April 21, 1932

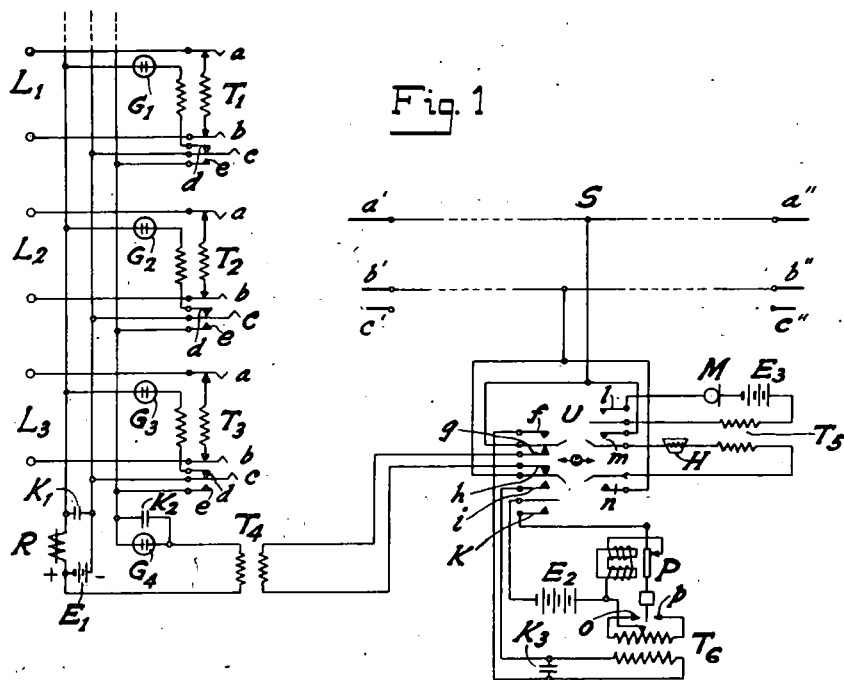
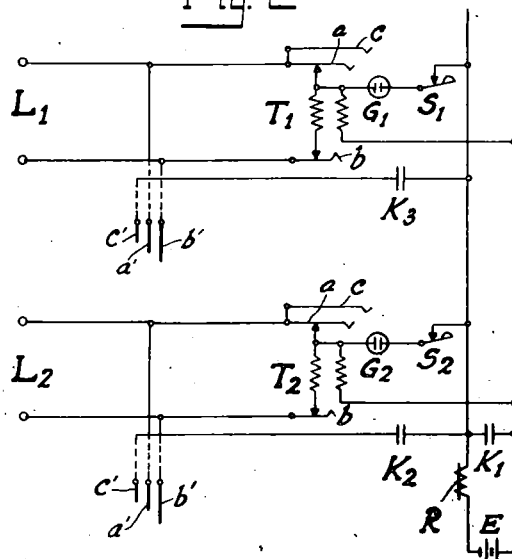


Fig. 2



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1,967,404
(179-84)

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Patented July 24, 1934

1,967,404

UNITED STATES PATENT OFFICE

1,967,404

SIGNALING APPARATUS

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Application April 21, 1932, Serial No. 606,735
In Germany April 22, 1931

12 Claims. (Cl. 179—84)

This invention relates to the use of neon lamps operating as signal indicators or receiving relays for signal transmission in communication systems and preferably in telephone systems.

5 According to one feature of the invention, the neon lamps are disposed in circuits coupled inductively to the lines. The lamp circuits are normally energized by a potential which is kept
10 between the striking and the extinguishing voltage of the lamps. Signaling current applied to a line is superimposed on the circuit of the associated lamp, causing the lamp to strike. The
15 lamp then remains lighted by the potential normally applied to its circuit until the current is interrupted upon the call being answered. A very simple and inexpensive line signaling arrangement is thus provided.

An additional feature of the invention relates to a method of supplying the neon lamps with
20 an extra impedance so as to reduce their sensitivity to voltage peaks occurring during a conversation. By means of this arrangement, the mean speech level also may be dropped according to the voltage of the neon lamps.

25 The features of the invention are more fully explained in conjunction with the accompanying drawing, comprising Figs. 1 and 2. Fig. 1 shows the embodiment of the invention in a system employing double ended cord circuits. Fig. 2 shows
30 the embodiment of the invention in a system employing single ended cord circuits.

Referring now to Fig. 1, three lines L1, L2, L3 have been shown. A series of additional lines
35 may be connected up in a similar manner. The lines are associated with corresponding neon lamps G1, G2, G3, their circuits having a common portion formed by the current source of supply E1, from which the pre-applied potential is derived, and the relay R. Parallel with the
40 current source of supply and relay R is connected the condenser K1 which serves the purpose of preventing a plurality of neon lamps from lighting simultaneously in consequence of the common coupling unit R. A connection between two lines,
45 for example the lines L1 and L3, is made in the following manner:

The neon lamp G1 lights up when the subscriber associated with line L1 initiates a call by ringing over the line. The exchange operator
50 inserts the plug designated a' , b' , c' of the connecting cord S into the corresponding jack of the line L1 and throws the change-over key U into the position in which enquiries are made, i. e. to the right. Inserting the plug as mentioned causes
55 the primary winding of the repeater T1 to be dis-

connected from the line L1, and the contact spring c is thrown from d over to e . This extinguishes the neon lamp G1, and the following circuit for the neon lamp G4, provided to indicate the clearing signal, is prepared: positive pole of battery
60 E1, primary winding of the repeater T4, G4, e , c , negative pole of battery E1. The contacts l , m and n are closed when the switch key U is set in enquiry position. Consequently the transmitter circuit for the operator's speaking set is closed
65 over E3, M, l , primary winding T5. The secondary circuit of the repeater T5 is connected to the line L1 over a circuit extending from secondary winding T5, receiver H, m , a' , a , L1, b , b' , n secondary
70 winding T5. The L1 line subscriber's request for a connection with the line L3 is duly noted and the plug a'' , b'' , c'' , of the connecting cord S is inserted into the jack which corresponds to the required line L3. The repeater T3 and the neon
75 lamp G3 are then disconnected from the line L3, and a second circuit for the clearing signal lamp G4 is prepared over the jack spring c and contact e . Ringing current is then transmitted to the subscriber connected to line L3 by the switch
80 key U being turned over to the left. Contacts g , h are opened and contacts f , i and k are closed. The pole alternator P, which acts as a ringing current source of supply, is caused to operate over:
85 battery E2, k , interrupter contact and magnet winding of said pole alternator. Positive and negative impulses are alternately transmitted through the primary winding of the repeater T6
90 over contacts o and p with the result that corresponding impulses pass to the line L3 over contacts f and i and the plug leads a'' and b'' and cause the subscriber's ringer to operate. The condenser K3 may serve to smooth the ringing
95 impulses.

The switch key U is now restored to speaking position, that is to say, it is thrown into its central position, and the connection between the two subscribers is then completed. The condenser
100 K2 which is connected in parallel with the neon lamp G4 prevents said neon lamp from lighting up during the conversation due to voltage peaks. When at the end of the call one of the subscribers gives the clearing signal, the neon lamp G4 is lighted due to the fact that the condenser K2
105 is not operative with low frequency ringing current. Withdrawing the plugs a' , b' , c' and a'' , b'' , c'' from the jacks causes the circuit over the neon lamp G4 to be cut off at contacts e .

Fig. 2 shows a somewhat different arrangement in which each subscriber's line is permanently connected to a cord such as a' , b' , c' . 110

The switching units corresponding to Fig. 1 are provided with the same reference characters. The neon lamp G1 is lighted when the subscriber associated with line L1 puts through a call. A momentary depression of the key S1 causes this lamp to be extinguished and the connection with the required line, for example the line L2, is set up. The plug leads *a'*, *b'*, *c'* are connected to the corresponding jack springs *a*, *b*, *c* of line L2, thus causing the repeater T2 to be disconnected from line L2. The neon lamp G1 remains connected to line L1, over the repeater T1 since it is adapted to operate as a clearing signal as well. The condenser K3, which is connected to the plug lead *c'* and to the jack spring *c* of line L2, and consequently also to the left hand side of the neon lamp G1 over the jack springs *a* of the lines L2 and L1, so that it, therefore, is connected in parallel with said lamp, prevents the neon lamp from lighting up in consequence of voltage peaks occurring during the conversation. The neon lamp G1 is re-lighted at the end of the call and therefore acts as a clearing signal.

What is claimed is:

1. In a telephone system, a line terminating in a primary winding of a repeating coil, a neon tube, a local circuit for said tube including the secondary winding of the repeating coil and a source of current whose potential is between the striking and extinguishing voltages of the tube, and manually controlled means for opening said local circuit.

2. In a telephone system, a line, a repeating coil having its primary winding bridged across the line, a neon tube associated with the line as a calling signal, a local circuit for said tube including the secondary winding of the repeating coil and a source of current whose potential is between the striking voltage and releasing voltage of the tube, means for extending a connection to the line, and contacts controlled by said last means for disconnecting the repeating coil from the line and for opening said local circuit.

3. In a telephone system, a plurality of lines each terminating in the primary winding of a repeating coil, a neon tube associated with each of said lines as a calling signal, a common circuit including a source of current, a relay and a condenser, and a local circuit for each of said tubes, each circuit including the secondary winding of the associated repeating coil and said common circuit.

4. In a telephone system, a line, a neon tube associated with the line at the exchange, circuit connections for causing said tube to strike responsive to a call signal on the line and to remain lighted, and manually controlled means for momentarily opening said circuit connections to extinguish the tube whereby the same is prepared to strike in response to a disconnect signal.

5. In a telephone system, a line, a neon tube associated with the line, circuit connections for causing the tube to light responsive to a call sig-

nal on the line, means for answering the call and for extending the same to the called line, and means responsive to the extension of the call for connecting a condenser in parallel with said tube.

6. A telephone system as claimed in claim 4 in which current of a potential insufficient to cause the tube to strike but sufficient to prevent it from extinguishing is normally applied to the tube independent of the line.

7. In a telephone system, a plurality of lines each terminating in the primary winding of a repeating coil, a common source of current, a neon tube associated with each line, a local circuit for each tube including the secondary winding the associated repeating coil and said common current source, means responsive to a call on a line for lighting the associated tube, a cord circuit adapted to connect with the lines to answer calls thereon, a neon tube adapted to operate as a disconnect signal for any of said lines, and means responsive to the connection of the cord circuit to a calling line for opening the local circuit of the tube associated with the line, for completing a local circuit including said common current source for said other neon tube, and for inductively connecting said last mentioned local circuit with the line.

8. A telephone system as claimed in claim 7 in which the neon tube used for the disconnect signal is shunted by a condenser to render it less sensitive to current peaks set up during conversations.

9. In a telephone system, subscribers' lines, means including a cord circuit at the exchange for connecting two of said lines for conversation, a neon lamp associated with said cord circuit as a supervisory signal, and circuit connections for said lamp such that a ring off signal received at said cord circuit will cause the lamp to operate.

10. In a telephone system as set forth in claim 9, means for extinguishing the lamp when the connection is pulled down.

11. In a telephone system, a plurality of subscribers' lines, means at the exchange for connecting two of said lines in a talking circuit, a neon lamp at the exchange functioning as a disconnect signal, a source of current applied to said lamp to maintain the same operated after its operation has been initiated, and circuit connections between the talking circuit and said lamp such that ringing current transmitted over one of the connected lines will initiate the operation of said lamp.

12. In a telephone system, subscribers' lines, means for answering a call on one of said lines and for connecting the same with another of said lines, a neon lamp, and circuit connections for said lamp such that the same operates as a call signal to call the operator and as a supervisory signal after the connection is completed.

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