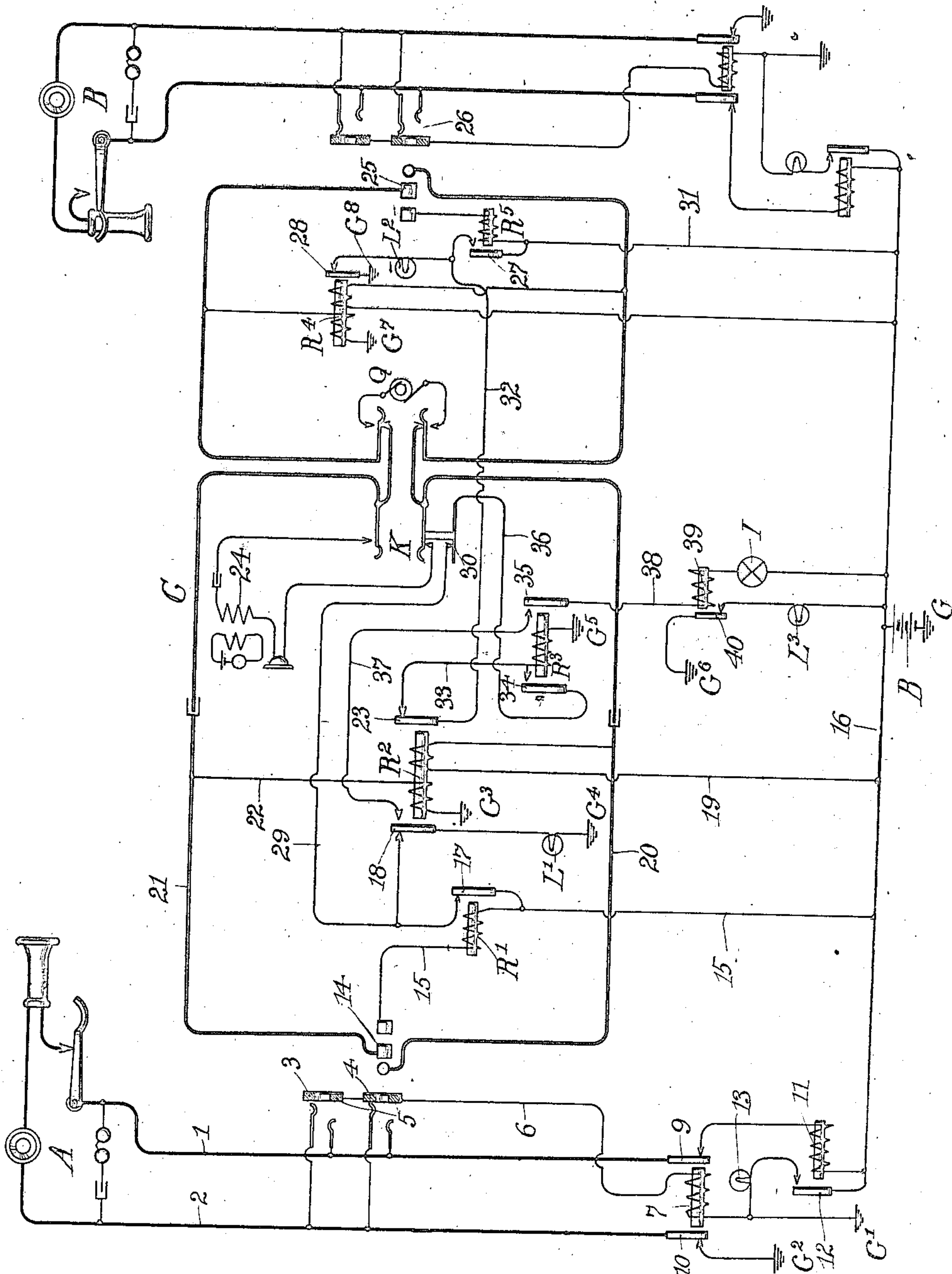


J. H. LEVIS, Jr.
TELEPHONE SYSTEM.
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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

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To all whom it may concern:

Be it known that I, JOHN H. LEVIS, JR., a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, 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 more particularly to the supervisory apparatus at the central station for giving a distinct and positive recall signal when a subscriber has finished one conversation and desires to be disconnected from the line of the subscriber with which his previous conversation was carried on, and to be connected to the line of another subscriber.

The object of the present invention is to provide an improved and simplified system for giving a distinctive and positive recall signal.

In the accompanying drawing, in which I have illustrated diagrammatically one form which my invention may take, I have shown apparatus applied to the answering end of the cord circuit for giving a distinctive recall signal. Generally it is the calling subscriber who is especially in need of quick recall service. This is due to the fact that a subscriber will make a number of calls in succession, as for example, where one bank calls practically every other bank in the city in quick succession in balancing up the day's account. A similar situation arises where a subscriber wishes to purchase a certain article and calls up all of the dealers in this line, in succession, for prices. In such situations a positive and distinct recall signal will save much annoyance and delay. In carrying out my invention, I employ an interrupter which is placed in series with the calling supervisory signal when the subscriber makes a recall.

The single figure on the drawings is a diagrammatic representation of a telephone system embodying my invention.

A plurality of subscribers stations such as A and B, are connected by suitable line wires to the central station C, where these lines are provided with the usual signaling and switching apparatus.

The calling station A is connected by the line wires 1 and 2 to the switching jacks 3

and 4, which are suitably multiplied together and any one of which may serve as an answering jack if so desired. The jack terminals 5 are connected by the third wire 6 through the cut-off relay 7 to ground at G^1 . The line wires 1 and 2 are connected through the armatures 9 and 10 to the battery B and ground G^2 respectively. The line relay 11 is connected in series with the battery connection and its armature 12 controls a line signal 13 to give the calling signal. When the subscriber raises the receiver from the switch-hook to make a call, and thereby connects together the line wires 1 and 2 through the substation instrument, the line relay 11 is energized attracting its armature 12 and thereby displaying the lamp signal 13 to the operator to indicate a desire for a connection. The operator observing the signal, inserts the answering plug 14 in the answering jack 4 to inquire of the calling subscriber the number of the line which it is desired to call. When the plug 14 is inserted in the jack 4, the cut-off relay 7 is operated over the following circuit:

Ground at G^1 , cut-off relay 7, jack 4, sleeve contact of the plug 14, third wire 15 of the cord, through the third wire relay R^1 over the battery bus 16 to grounded battery at G .

The armature 17 of the relay R^1 is thereby attracted and the answering supervisory lamp L^1 would be energized except that its circuit is broken at the armature 18 of the supervisory relay R^2 . The supervisory relay R^2 is energized over the following circuit:

Battery B, bus 16, wire 19, through one winding of the relay R^2 to the tip strand 20 of the cord, thence over the tip side of the line 1, through the substation instrument back over the line 2 to the sleeve strand 21 of the cord circuit, wire 22, through the other winding of relay R^2 , and to ground at G^3 .

The two parts of the winding of the relay R^2 are wound cumulatively, and as long as the switch hook at the substation A is closed, the relay R^2 will remain energized and will hold its armatures 18 and 23 in attracted position. The operator connects her telephone set 24 to the cord by operating the key K and having ascertained the number of the desired subscriber, inserts the calling plug 25 in the jack 26 of the desired sub-

scriber which in this case is the subscriber at the substation B. The third wire relay R^5 is energized by the insertion of the plug 25 in jack 26 and it attracts its armature 27 to energize the called supervisory lamp L^2 as the subscriber at the substation B has not yet responded. The called subscriber is rung in the usual manner and upon response of the called subscriber, the supervisory relay R^4 is energized to attract its armature 28 to extinguish the calling lamp L^2 . Conversation is carried on in the usual manner and upon either subscriber restoring his receiver to the switch hook to break the corresponding line circuit, the corresponding supervisory relay is de-energized and the corresponding supervisory lamp is lighted to indicate that the cord circuit is to be disconnected.

Assume, however, that the calling subscriber desires another connection instead of giving the disconnect signal, he restores his receiver to the switch hook and then raises it again to give the recall signal. When the subscriber at the substation A restores his receiver to the switch hook the supervisory relay R^2 is de-energized and its armatures 18 and 23 fall back to their back contacts. The third wire relay R^1 is energized since the plug 14 is in the jack 4. Likewise, the third wire relay R^5 is energized as the corresponding calling plug is still in the jack. The relay R^5 prepares a circuit for energizing the locking relay R^3 , this locking circuit being closed at the armature 23 and its back contact of the relay R^2 when the same is de-energized. This circuit may be traced as follows:

Battery B, battery bus 16, third wire 31, armature 27 of the relay R^5 , wire 32, armature 23 of the relay R^2 , wire 33, winding of the relay R^3 , and ground at G^5 .

The relay R^3 is energized and it attracts its armatures 34 and 35, the armature 34 closing a locking circuit for the relay R^3 by way of the wire 36, key contact 30, wire 29, armature 17 of the relay R^1 , wire 15, battery bus 16 and battery at B. The relay R^3 is now locked up and held energized so that when the subscriber at substation A again raises the receiver to give the recall signal, the circuit of the relay R^3 will not be broken, although its first energizing circuit through the armature 23, is broken, by energization of the relay R^2 . The armature 18 of the relay R^2 is attracted to its front contact and closes an energizing circuit for the lamp L^1 over the following circuit:

Ground at G^4 , lamp L^1 , armature 18, wire 37, armature 35 of the locking relay R^3 , wire 38, winding of the pilot relay 39, interrupter I, to battery B.

The interrupter I, interrupts the flow of current in a characteristic manner to flash the lamp L^1 thereby indicating that the

calling subscriber desires further connection. A suitable pilot light L^3 common to a number of cords, has its circuit controlled by the armature 40 of the relay 39. It can thus be seen that the lamp signal L^1 will be displayed in a characteristic manner to give a recall signal. The operator will then operate the key K to ascertain the wants of the subscriber A, and in operating the key K, opens the locking circuit of the relay R^3 thereby obliterating the recall signal. After the completion of a second connection, the subscriber A may give a disconnect signal or may give another recall signal as desired. Giving of the recall signal is dependent upon the act of the calling subscriber and upon energization of the third wire relay in the calling end of the cord.

It is to be understood that the recall signal may be installed upon the calling end of the cord or upon both ends, if desired.

While I have described my invention with reference to a particular embodiment, I desire that the appended claims be construed as not limited to the precise details of construction shown, but to include such modifications and variations as will be apparent to those skilled in the art, and all such minor changes and deviations as will be made to fit particular installations, I consider to come within the spirit and scope of my invention.

What I claim is:

1. In combination, a supervisory lamp, a sleeve relay, a supervisory relay, a locking relay, a source of steady current and a source of distinctive signaling current for illuminating said supervisory lamp, the circuit of said lamp being controlled directly by said sleeve relay and said supervisory relay to connect it to said source of steady current, and being controlled directly by said supervisory relay and said locking relay to connect it to said source of distinctive signaling current to give a distinctive recall signal, the connection of said supervisory signal to said source of distinctive signaling current being cut through the contacts of said locking relay.

2. In combination, a cord circuit, a supervisory lamp, an answering sleeve relay, a calling sleeve relay, a supervisory relay, a locking relay, said locking relay having a circuit controlled by said calling sleeve relay and said supervisory relay, and an interrupter, said lamp being switched from the control of said answering sleeve relay to the interrupter circuit, said interrupter circuit being under the control of said locking relay.

3. In combination, a plurality of lines, a cord circuit for interconnecting said lines, a supervisory lamp, a sleeve relay, a circuit controlled by said relay for causing steady illumination of said lamp, a supervisory relay, a locking relay having its initial ener-

gization controlled by said sleeve relay and said supervisory relay, and an interrupter switch, said lamp being disconnected by said supervisory relay from said first circuit and
5 connected to said interrupter to give a distinctive recall signal.

4. In combination, a plurality of lines, a cord circuit for interconnecting said lines, a supervisory lamp for said cord circuit, a
10 supervisory relay, an answering sleeve relay, a calling sleeve relay, a locking relay, an energizing circuit for said locking relay controlled by said calling sleeve relay, a locking circuit for said locking relay controlled
15 by said answering sleeve relay, a circuit controlled by said answering sleeve relay and said supervisory relay for causing steady illumination of said lamp, an interrupting switch, and a circuit for said switch controlled by said locking relay and said super-
20 visory relay for causing said lamp to give a distinctive recall signal.

5. In combination, a link circuit comprising a supervisory signal, a sleeve relay, a
25 supervisory relay, a locking relay, a source of steady current, a source of distinctive signaling current, said sleeve relay being energized upon connection of the link circuit to a line and preparing a locking circuit for
30 the locking relay and preparing a circuit from the source of steady current for said supervisory signal, and a second sleeve relay for the other end of the link circuit energized when said end is connected to another
35 line and preparing a circuit for initial energization of the locking relay through a back contact of the supervisory relay, said locking relay being initially energized upon de-energization of the supervisory relay, said

locking relay controlling the connection of 40 said source of distinctive signaling current to said supervisory signal.

6. In combination, a plurality of lines, a cord circuit for interconnecting said lines, a supervisory lamp, a supervisory relay hav- 45 ing an armature and front and back contacts, a sleeve relay, a locking relay, said lamp being connected to the armature of said supervisory relay, an energizing circuit for the lamp connected to a back contact of the su- 50 pervisory relay and out through the contact of the sleeve relay, said locking relay having an initial energizing circuit controlled by another back contact of the supervisory relay, and a distinctive signal operating cir- 55 cuit controlled by the locking relay, for operating said supervisory lamp.

7. In combination, a plurality of lines, a cord circuit for interconnecting said lines, a supervisory lamp, a supervisory relay hav- 60 ing an armature and front and back contacts, a sleeve relay, a locking relay, said lamp being connected to the armature of said supervisory relay, an energizing circuit for the lamp connected to a back contact of 65 the supervisory relay and cut through the contact of the sleeve relay, said locking relay having an initial energizing circuit controlled by another back contact of the super- 70 visory relay, and a distinctive signal operating circuit controlled by the locking relay, and a calling sleeve relay, said initial energizing circuit being cut through the contact of the calling sleeve relay.

In witness whereof, I hereunto subscribe 75 my name this 9th day of Nov. A. D. 1915.

JOHN H. LEVIS, JR.