

Sept. 8, 1925.

1,552,709

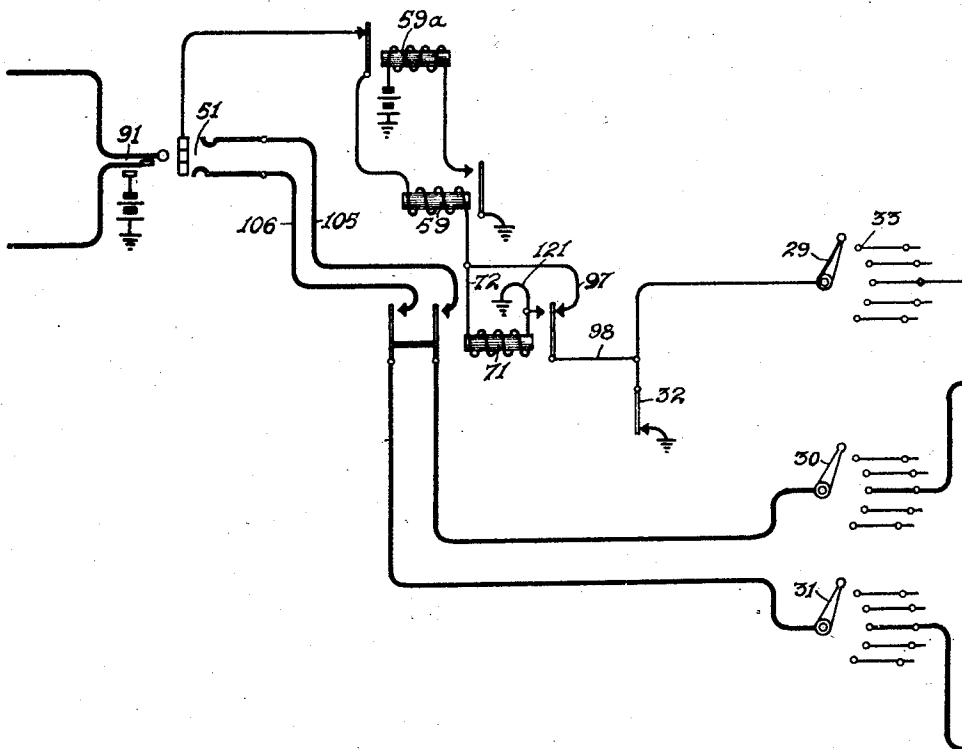
L. D. KELLOGG

TELEPHONE SYSTEM

Filed June 29, 1918

2 Sheets-Sheet 1

Fig. I.



Inventor:
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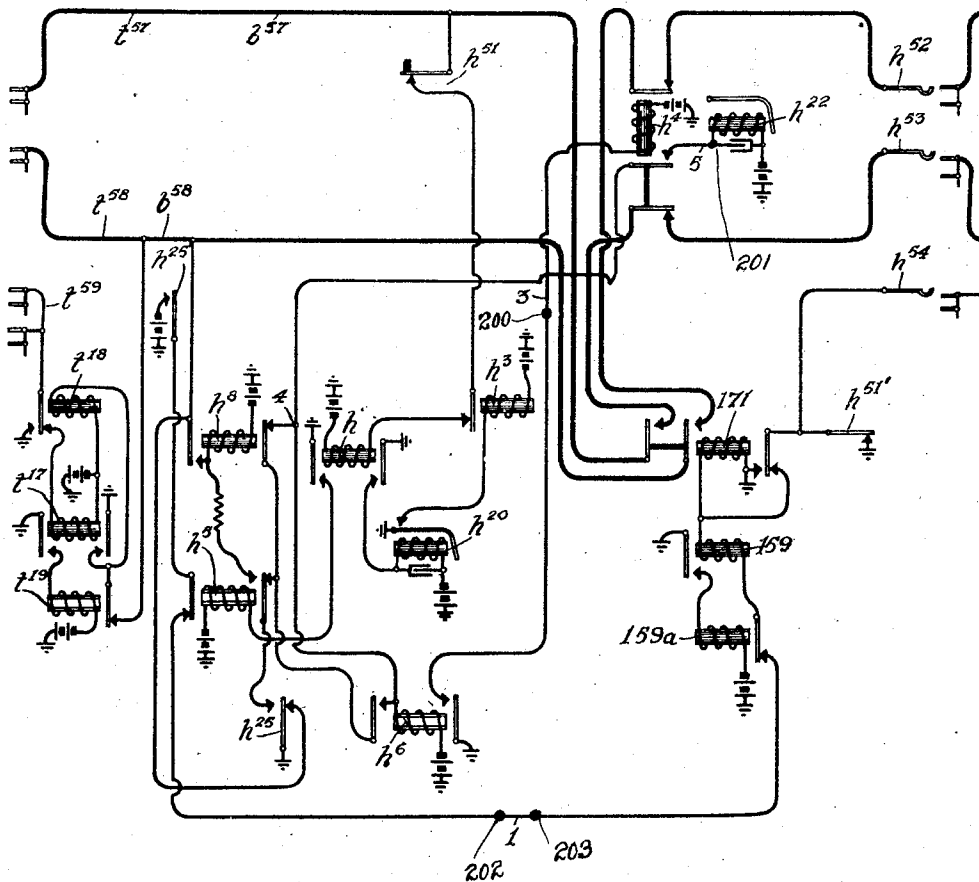
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2 Sheets-Sheet 2

Fig. 2.



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Patented Sept. 8, 1925.

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UNITED STATES PATENT OFFICE.

LEROY D. KELLOGG, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TELEPHONE SYSTEM.

Application filed June 29, 1918. Serial No. 242,548.

To all whom it may concern:

Be it known that I, LEROY D. KELLOGG, a citizen of the United States, residing in the city of Chicago, Cook County, Illinois, have invented new and useful Improvements in Telephone Systems, of which the following is a specification.

My invention relates to telephone circuits, and more particularly to those for use in automatic selecting systems.

I have illustrated my invention in connection with a selector switch, and its object is to provide an improved organization for selecting the idle trunk and for controlling the continuity of the talking strands in conjunction with an improved method of release control.

I have adapted the automatic trunk selecting scheme as illustrated in patent to Land No. 1,146,177, dated July 13, 1915, for use in connection with the second selector circuit shown in patent to Harry G. Webster, No. 1,252,974, dated January 8, 1918, and in combining them, have developed the improvements before referred to.

Referring to the drawings, Figure 1 shows the automatic selecting system of the Land patent as arranged for use in practicing the invention. Figure 2 shows the second selector circuit of Figure 3 of the aforesaid mentioned Webster patent as reorganized to show the present invention.

Referring first to Figure 1, the reference characters correspond to those of the Land patent. Instead, however, of retaining the individual interrupter on the driving magnet 59 of the patent, I have employed the well known expedient of an individual interrupter relay designated 59^a. A peculiarity of the circuit of Figure 1 is that the same operates equally well whether 59^a is employed in the function of a relay, 59 being the driving magnet, or 59 is used for the relay function and 59^a is the driving magnet. I prefer to employ 59^a as the magnet, inasmuch as by using 59 as the relay so large a volume of current is not required to be drawn through the wiper contact 29, as would be the case if 59 drove the switch.

Briefly, the operator inserting plug 91 in jack 51 closes battery through the ring, plug-and-jack contact and through relay 59, conductors 97 and 98 to ground through off normal contact 32. A branch of this circuit extends through relay 71 to ground, but the

latter does not operate on account of the short circuit. 59 operating energizes driving magnet 59^a which advances wipers 29, 30 and 31 to engage the first multiple contact set, off normal contact 32 opening. The armature of 59^a opens circuit through relay 59 and the latter's armature falls back de-energizing 59^a. If the engaged contact 33 is busy, it will be connected direct to ground through the attracted armature of some relay 71 in another switch, and the armature of magnet 59^a having now fallen back, relay 59 will again operate and the process be repeated, in a sort of see-saw relationship, relay 71 being still short circuited to ground at each busy contact engaged by wiper 29.

As soon as an idle contact set is engaged by the wipers, relay 71 is obviously no longer short circuited, owing to the absence of ground from the contact 33 then engaged by wiper 29, and the current traverses relay 71 and it attracts its armature. The switch travel ceases since relay 59 has its winding so proportioned to that of relay 71 that it does not attract its armature when in serial relation with the latter.

Relay 71 in operating connected ground directly to wiper 29 and to the engaged contact 33, thus rendering it busy, and also connects the talking strands 105-106, through to the talking wipers 30 and 31. Relay 71 in energizing also engages the releasing mechanism of the switch and upon the withdrawal of plug 91, 71 deenergizes releasing the switch which is spring returned to normal; all in the general way described in said Land patent.

Referring now to Figure 2, various elements have been given the same reference characters as given in Figure 3 of the Webster patent, in so far as the elements are the same in function. No detailed description of the primary selecting operation of the second selector need be given, as it is the same as given in the patent referred to.

The switch of Figure 2 has been provided with a second primary off normal contact $h^{25'}$, which is shifted to close its contact simultaneously with the off normal switch h^{25} . Also a second secondary off normal switch $h^{51'}$ is provided which is shifted to open its contact simultaneously with h^{51} and is restored at the same time. Relay h^2 of the patent is omitted and the automatic selecting arrangement of Figure 1 is sub-

stituted for it, the magnet 159^a now assuming the functions of magnet h^{21} of the patent.

Assuming that the primary selecting of the switch has been accomplished as described in the patent, relay h^5 of Figure 2 allows its armature to retract and circuit is closed from battery through the now closed contact $h^{25'}$, left hand armature of relay h^5 , armature of secondary or vertical magnet 159^a, relay 159, to ground at secondary or vertical off normal contact $h^{51'}$, relay 171 being at this time shunted and unoperated. The selecting now proceeds just as described for Figure 1, and when a set of idle contacts are engaged by wipers h^{54} , h^{53} , h^{52} , relay 171 energizes on account of the absence of ground from the contact engaged by wiper h^{54} , and further travel of the switch does not occur. Relay 171 continues the talking strands through to the talking wipers and connects ground to wiper h^{54} and its engaged private contact.

The release of the switch is initiated as described in the Webster patent. The relay h^8 deenergizes on the opening of its locking circuit over strand t^{58} to the first selector. The retracted right armature of relay h^8 then energizes relay h^6 , which latter by its right armature operates relay h^4 and in consequence release magnet h^{22} energizes through the contacts of relays h^8 and h^5 to ground at off normal contact h^{25} .

The selector of my invention may be modified whereby the relay h^4 , together with its three armature contacts may be omitted, the talking strands from the contacts of relay 171 being carried direct to the wipers h^{52} and h^{53} . To effect such a modification, the release relay h^{22} will be connected directly in circuit with conductor 3 by means of a conductor (not shown on the drawing) connecting points 200 and 201. A third armature will be added to relay h^6 , which armature will be connected to conductor 1 at point 202 and will normally engage a contact which is (when relay h^6 is in its de-energized position) also connected to conductor 1 at point 203, to close an energizing circuit for relays 159 and 171, the said conductor 1, in this instance, being opened between points 202 and 203 so that the circuit for relays 159 and 171 will extend through the third armature and its associated contact, which are now provided on the relay h^6 and connected to conductor 1 at points 202 and 203, respectively.

It will be remembered that relay h^6 energizes to release the selector. In this present modification of the invention the right hand armature of h^6 directly closes the circuit of release magnet h^{22} , while the third armature added for effecting the modification will open the circuit through relay 171, whose deenergization opens the circuits of the talk-

ing strands extending to wipers h^{52} , h^{53} . The release then proceeds as before, the off normal springs being shifted back to their normal positions as described in the patent.

It is to be understood that the mechanical structures to be employed with the circuits illustrated are respectively those of the Land and Webster patents referred to. The invention is not limited to the precise structures illustrated and described, but can obviously be adapted to various sorts of automatic selecting systems, and the appended claims are intended to cover the invention in general aspect.

I claim as my invention:

1. A selector including a selection controlling relay having a battery in series with its winding during selecting travel, a wiper connected with said relay and a circuit therethrough, while said wiper engages busy contacts, diverting current from said relay whereby it remains unoperated, an idle contact without a current diverting connection whereby on connection made therewith by said wiper said relay operates, and means operable to deenergize the first mentioned relay, when the connection with said idle contact is no longer desired.

2. A selector including a selection controlling relay having a battery in series with its winding during selecting travel, a wiper connected with said relay and a circuit therethrough, while said wiper engages busy contacts, diverting current from said relay whereby it remains unoperated, an idle contact without a current diverting connection whereby on connection made therewith by said wiper said relay operates, a second relay in series with the first arranged to actuate its armature only when said first relay is shunted, a selector adjusting magnet in a local circuit controlled solely by the second relay, a slow release electromagnet for said selector holding its armature during impulse openings of its circuit, its armature retracting at the conclusion of an impulse set, to close the circuit of said relays whereby the automatic selection is started.

3. A selector including a selection controlling relay having a battery in series with its winding during selecting travel, a wiper connected with said relay and a circuit therethrough, while said wiper engages busy contacts, diverting current from said relay whereby it remains unoperated, an idle contact without a current diverting connection whereby on connection made therewith by said wiper said relay operates, a talking strand rendered continuous when said selection controlling relay is energized and discontinuous when it is deenergized, a second relay in series with the first arranged to actuate its armature only when said first relay is shunted, a selector adjusting magnet in a local circuit controlled by the second relay,

a slow release electromagnet for said selector holding its armature during impulse openings of its circuit, its armature retracting at the conclusion of an impulse set, to close the circuit of said relays whereby the automatic selection is started, and a relay included in said selector energized to restore the same and having a normally closed circuit contact opened when said relay energizes to deenergize the first mentioned relay.

4. A selector including a driving magnet and relay controlling said magnet in see-saw relation, an operating circuit for said driving magnet and controlled solely by said relay, and a slow release electromagnet holding its armature during impulse openings of its circuit, said armature retracting at the conclusion of an impulse set energizing said relay to initiate automatic selecting travel of said selector.

5. A selector including a driving magnet and relay controlling said magnet in see-saw relation, an energizing circuit for said driving magnet and controlled solely by said relay, a slow release electromagnet holding its armature during impulse openings of its circuit, said armature retracting at the conclusion of an impulse set energizing said relay to initiate automatic selecting travel of said selector, and a second relay shunted during selecting travel of said selector but operated after selection is made to hold the selected contact.

6. A selecting switch provided with a driving magnet and a relay controlling said magnet in see-saw relation, an energizing circuit for said driving magnet and controlled solely by said relay, a contact adapted to be closed to initiate automatic selecting travel for said selector, a second relay having its winding normally shunted, means for removing said shunt when the selecting travel of said selector is initiated and for replacing it by a second shunt which is maintained as long as the selector engages busy contacts.

7. A selector of the character described comprising a driving magnet, a relay adapted to be connected in see-saw relation with said magnet, a contact adapted to be closed to start the operation of said magnet and relay to cause selective travel of said selector, a second relay for rendering inert said magnet and first relay and connected to have its winding normally shunted when said selector is in its normally inoperated position, and also shunted during the selective travel of said selector.

8. A selector provided with a driving magnet and a relay connected in see-saw re-

lation, means for energizing said magnet and relay thereby causing selective travel of said selector, a second relay having its winding in a normally closed short-circuited condition when said selector is in its normally inoperated position and which remains in such condition during selective travel of said selector and while said selector is engaging busy contacts, said last relay adapted when operated to prevent further operations of said magnet and first relay.

9. A selector including a driving magnet, a relay controlling a contact in the circuit of said driving magnet, a circuit for said relay passing through a contact controlled by said driving magnet, means for closing the circuit of said relay thereby causing selective travel of said selector, and a second relay having a winding in a normally closed shunted condition when said selector is in its normally inoperated position and which remains in such condition during selective travel of said selector, said second relay adapted when operated to prevent further selective travel of said selector.

10. A selector provided with a driving magnet, a relay controlling a contact in the circuit of said driving magnet, a circuit for said relay including a contact of said driving magnet, a second relay having its winding in a normally closed shunted condition when said selector is in its inoperated position and which remains in such condition during selective travel of said selector, and means for removing the shunt from around said second relay whereby it is placed in circuit with said first relay to prevent further operation of the said first relay.

11. A selector of the character described with a driving magnet, a relay controlling a contact in the circuit of said driving magnet, a circuit for said relay controlled by said driving magnet, a second relay having its winding connected in circuit with said first relay and of a resistance to prevent an operative energization of said first relay, a normally closed shunt circuit about the winding of said second relay when said selector is in its normally inoperated position, said shunt remaining closed during the selective travel of said selector, and means for removing said shunt whereby said second relays is placed in circuit with said first relay to prevent further operations thereof.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 27th day of June, 1918.

LEROY D. KELLOGG.