C. S. WINSTON.

CALL DISTRIBUTING SYSTEM.

APPLICATION FILED AUG. 4, 1913.

1,144,084.

Patented June 22, 1915.

2 SHEETS—SHEET 1.

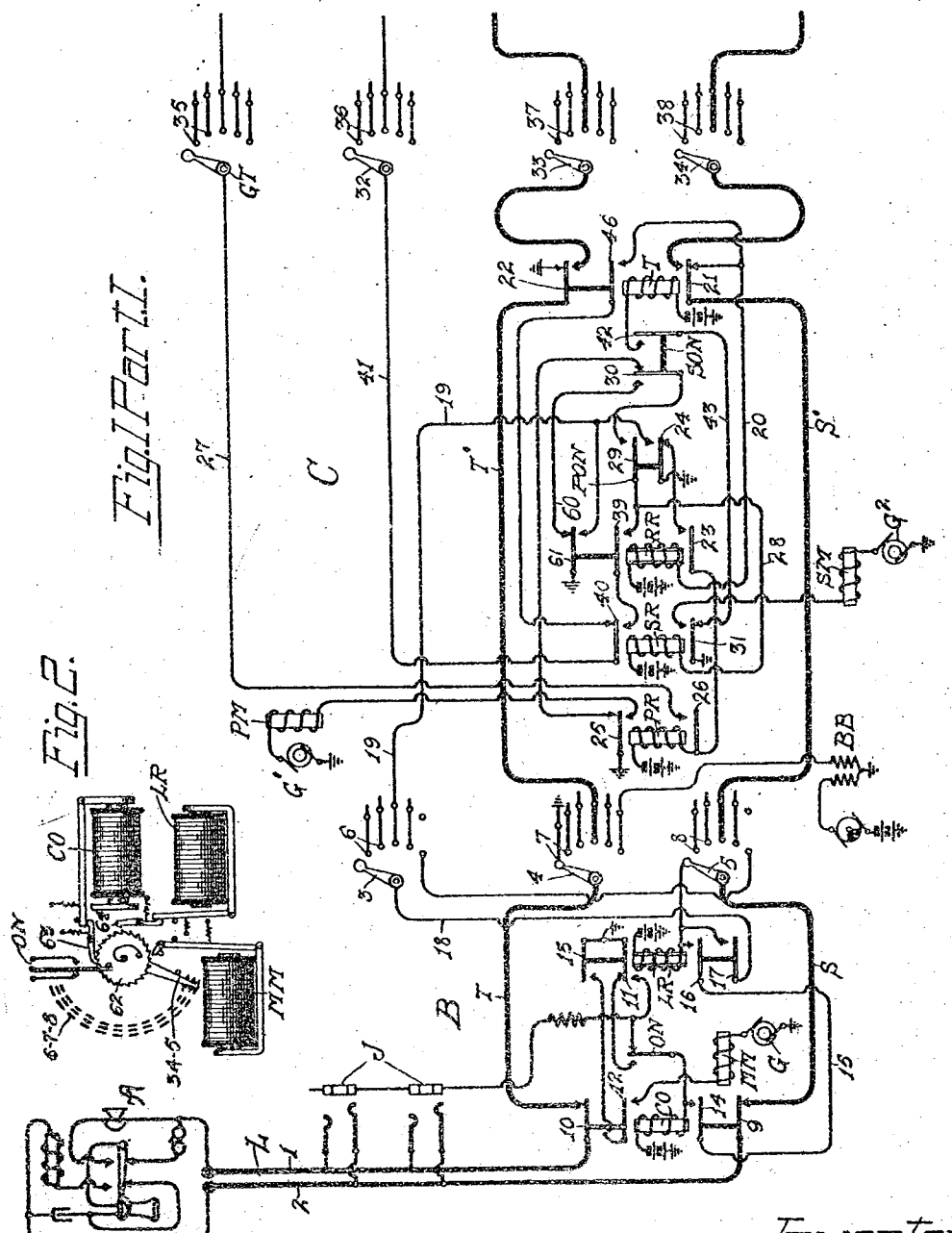

Fig. 1 Part 1.

Fig. 2.

Witnesses:

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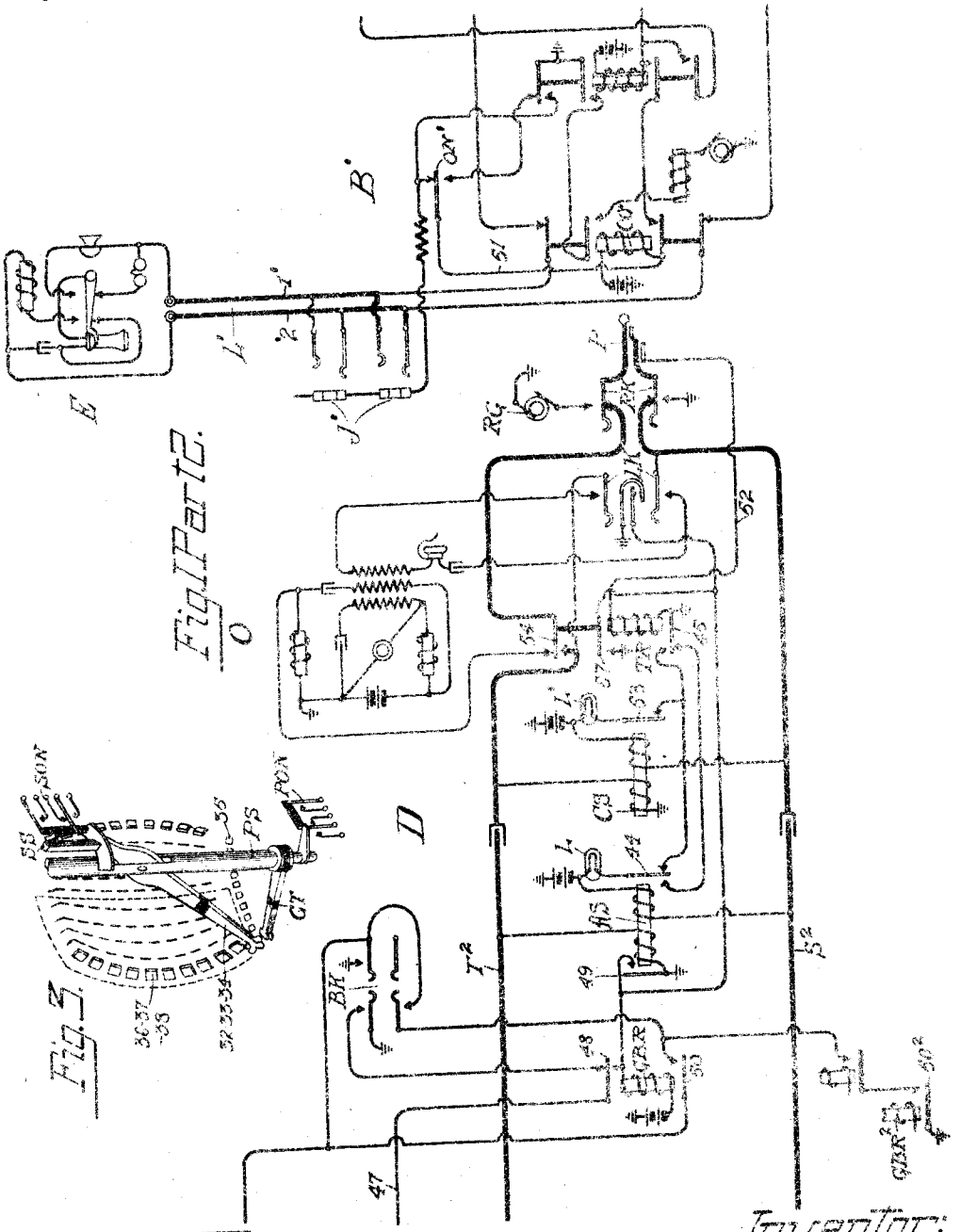

Fig. 2.

Fig. 2.

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UNITED STATES PATENT OFFICE.

CHARLES S. WINSTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CALL-DISTRIBUTING SYSTEM.

1,144,084. Specification of Letters Patent. Patented June 22, 1915.

Application filed August 4, 1913. Serial No. 782,803.

To all whom it may concern:

Be it known that I, CHARLES S. WINSTON, a citizen of the United States of America, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Call-Distributing Systems, of which the following is a specification.

In general my invention relates to call-distributing systems and is directed more particularly to improved selecting means for interconnecting calling lines and idle operators' link circuits.

One of the features of my invention is the provision of simple individual line switches which are adapted to operate upon initiation of a call over the associated line to automatically select an idle cord selector switch preferably of greater capacity, thus giving each telephone line access to a comparatively large number of operators' link circuits.

For a more complete understanding of my invention reference is to be had to the accompanying drawings in which like reference characters denote like parts and in which—

Figure 1 composed of parts 1 and 2, illustrates a call-distributing system embodying my invention; Fig. 2 illustrates diagrammatically a mechanical line switch adapted to operate in connection with the line switch circuit B; and Fig. 3 illustrates diagrammatically the preferred contact bank and wiper arrangement employed in connection with the cord selector switch circuit C.

Referring now more in general to my invention as illustrated, it comprises a substation A connected by the line conductors L to multiple jacks J and also to an individual line switch B at the central office, there being one such individual switch B associated with each substation. The switches B each have access to a plurality of cord selectors C. The cord selector switches C are divided into groups, each group having its bank terminals multiply connected and extended to cord circuits D which are also divided into groups and distributed among the different operators' positions. At the right of Fig. 1, part 2, I have illustrated a called substation E connected by the line conductors L^1 to apparatus similar to that connected to the substation A.

In general the system of Fig. 1 operates as follows: The subscriber at A removes the receiver from the switch-hook which act starts the individual line switch wipers 3, 4 and 5 stepping around to select an idle cord selector switch C. As soon as the individual line switch has selected an idle cord selector switch C, the selected cord selector switch C operates to step the group wiper GT to select an idle group of cord circuits D, after which the wipers 32, 33, 34 are stepped to select an idle cord circuit in the group. Upon selection of the cord circuit, a calling lamp L is lighted signaling the operator. The operator throws the listening key LK and assuming that it is substation E wanted she inserts the plug P into the jack J^1 thus connecting the calling substation with the wanted line. After the conversation has been finished the subscribers restore their respective receivers to the switch-hooks lighting the two supervisory lamps L and L^1 in the cord circuit, the operator disconnecting the plug from its jack. The cord selector C and the individual line switch B are restored to normal and are now available for use in establishing other connections.

Before proceeding with a more detailed description of Fig. 1, I will refer to the selector mechanism C illustrated in Fig. 3 of the cord which is preferably employed.

For use with the selector and connector circuits of the system of Figs. 1 and 2, a switch such as is shown in an application of William Kaisling for automatic switch for telephone systems, Serial No. 600,664, filed January 3rd, 1911, may be used.

The switch referred to in the previous paragraph, in general comprises a bank of contacts made up of 100 sets of contacts with three contacts 36, 37, 38, to each set, and divided into ten groups of ten contact sets each as illustrated diagrammatically in Fig. 3. A set of wipers 32, 33, 34, are provided, to coöperate with the bank contacts, a primary magnet (corresponding to PM of the switch circuits) being adapted to primarily adjust the wipers through the medium of a primary shaft PS to select a group of contacts, and a secondary magnet (corresponding to SM of the switch circuits) is provided to step the wipers through the medium of a secondary shaft SS in a secondary direction in a plane at right angles to the primary, to select a contact set of the selected group. The switch con-

struction is such that the wipers are advanced against the tension of a pair of so-called wiper springs, one spring opposing each movement respectively.

For each row or group of contacts 36, 37, 38, a group contact 35 is provided and a group wiper GT is adapted to engage said group contacts 35. For each primary step of the switch shaft PS advances wiper GT from one contact 35 to the next one, this movement also carrying wipers 32, 33, 34, along from row to row. After the primary adjustment to select a row or group of contacts, wipers 32, 33, 34, are rotated by a secondary adjustment to select a contact of the selected group.

To release the wipers, that is, to restore them to normal, the secondary magnet is again actuated to step the wipers in a secondary direction beyond the last contact of the group whereby they are automatically restored to normal by the springs referred to, but over a different path than that taken by the wipers in the advance movement of the switch in selecting a contact, such a complete travel of the wipers being indicated by the dotted line in Fig. 3. Thus, in the operation of the switch the contacting ends of the wipers travel in a primary direction to select a group of contacts, then in a secondary direction to select a contact in the group, and in the release of the wipers this secondary travel is continued until the contacting ends have passed beyond the last contact in the group, whereby they are automatically released to continue their restoration to normal, this continued movement being in a plane parallel to the primary movement but in an opposite direction until they reach a point directly above the starting point when they are moved downwardly through a plane parallel to the secondary movement, but in a direction opposite to the secondary movement, until they reach their normal starting point.

A set of primary off-normal spring contacts PON are moved upon the first primary step of the switch while a set of secondary off-normal spring contacts SON are moved upon the first secondary step of the switch.

Fig. 2 illustrates diagrammatically a switch mechanism adapted to operate in connection with circuit B, like reference characters denoting like parts. This switch comprises sets of bank contacts 6, 7, 8, preferably ten, and coöperating wipers 3, 4, and 5 which are mounted upon a central shaft carrying a ratchet wheel 62 adapted to be driven by the motor magnet MM. It will be noted that two check pawls 63 and 64 are employed, pawl 63 being normally in engagement with ratchet 62 while pawl 64 is normally out of engagement with said ratchet. In the operation of Fig. 2, in accordance with circuit B, upon the initiation of a call by the removal of the receiver from the switch-hook, line relay LR is energized thus causing the associated pawl 64 to engage ratchet wheel 62 and thereafter the cut-off relay CO is energized causing its associated pawl 63 to disengage the ratchet wheel 62. Thereafter the motor magnet MM advances the wipers over the contacts followed by the deënergization of CO, but LR is maintained energized so that both pawls 63 and 64 are engaging ratchet wheel 63. To release the switch B, line relay LR is deënergized thus withdrawing pawl 64 from engagement with ratchet 62 and thereafter cut-off relay CO is again energized moving pawl out of engagement with ratchet 62 allowing the wipers to be restored by a suitable spring. On the first step off normal, contacts ON assume their alternate position and are maintained so until the wipers are restored whereby said contacts ON are again moved to their normal position.

Referring now more in detail to the apparatus employed in illustrating my invention, it comprises a well-known type of substation A connected by the line L comprising conductors 1 and 2 to an individual line switch B, and multiple jacks at the switchboard at the central office. The said individual line switch B comprises a line relay LR energized upon initiation of a call, a cut-off relay CO operated upon energization of relay LR, and the motor magnet MM which steps the wipers 3, 4, and 5 to select an idle cord selector switch C. Off normal contacts ON are provided and they assume their alternate position on the first step of the wipers 3, 4, and 5. The lines and line switches B may be grouped in any desirable manner but I preferably arrange them in groups of 100 with ten associated cord selectors C. I preferably use two-dimension 100 point, cord selector switches, having ten groups of ten contact sets multiply connected to cord circuits D. The cord selectors are adapted to test the cords by groups and then individually to select an idle cord in a selected group.

The cord selector C comprises a release relay RR which is energized when an individual line switch B picks out an idle cord selector with which RR is associated. The primary relay PR is energized by the operation of RR, thus closing a circuit for primary magnet PM which steps the group test wiper GT in a primary direction to select an idle group of cord circuits. A secondary relay SR is also provided which upon energization, operates a secondary magnet SM to step the wipers 32, 33, and 34 in a secondary direction to select an idle cord circuit in the selected group. Primary off-normal contacts PON and secondary off-normal contacts SON are provided, the pri-

mary off-normal contacts PON assuming their alternate position upon the first primary step of the switch and the secondary off-normal contacts SON assume their alternate position upon the first secondary step of the wipers.

Now referring to the cord circuit D it comprises a group busy relay GBR, one of these relays being associated with each cord circuit and having a series ground extending through its normally open contacts 50 to ground at normally open ground 50^2 of the group busy relay of another cord circuit. So long as all of the relays GBR of a group are energized this ground connection from alternate contact 50^2 associated with them reaches the associated group contacts 35, rendering the group non-selectable by a group test wiper GT. As long as one group relay associated with the ten cord circuits is deënergized the series ground will be interrupted and the group contact will remain selectable. An answering supervisory relay AS is provided and when energized by a substation calling, closes its alternate contacts to light the calling lamp L to notify the operator at O that a substation is calling. A calling supervisory relay CS is also provided and is energized when the called subscriber hangs up to light the supervisory lamp L^1 to notify the operator at O that the conversation is finished. A test relay TR is provided which operates in series with the cut-off relay CO^1 of the individual switch B^1. A listening key LK is provided and a ringing key RK, a ringing generator RG and the calling plug P. A busy key BK is also provided and when said key is thrown to the right all the cord circuits of the corresponding group beyond this circuit will be made busy, and when the key is thrown to the left the particular cord circuit will be made busy without effecting in any way the remaining cord circuits of the same group.

Operation.—Assuming now that the subscriber at substation A wishes to converse with the subscriber at substation E, the subscriber at A removes his receiver from the switch-hook, this act causing the energization of the line relay LR over a circuit traced from battery through the winding of relay LR, wiper 5, conductor S, normal contact 9 of cut-off relay CO, conductor 2, through the substation A, conductor 1, normal contact 10 of cut-off relay CO, wiper 4, contact 7 to ground. Upon the energization of relay LR an energizing circuit for the cut-off relay CO is established from battery through the winding of cut-off relay CO, the normal contact of off-normal contacts ON, to ground at alternate contact 11 of relay LR, energizing the cut-off relay CO. Relay CO therefore closes its alternate contact 12 which establishes an energizing circuit for the motor magnet MM traced from ungrounded pole of alternating current generator G through the motor magnet MM, alternate contacts 12, 13, to ground. The motor magnet MM energizes stepping the wipers 3, 4, and 5 around and if the first contacts are busy the motor magnet continues to step the wipers around until an ungrounded test contact 6 is encountered. Upon the first step of the wipers, the off-normal switch ON assumes its alternate position opening the energizing circuit for cut-off relay CO but assuming that the first contact is busy, another circuit for relay CO is established from battery through the winding of CO, alternate contact 14, conductor 15, alternate contacts 16, 17 of relay LR, conductor 18, wiper 3, contact 6, conductor 19 to ground at an alternate contact of primary off-normal contacts PON of another cord selector associated with the busy contact. When the private wiper 3 finds an ungrounded contact, relay CO deënergizes interrupting the circuit of the motor magnet MM and rendering the wipers 3, 4 and 5 inert.

When the individual line switch has selected an idle cord selector C, the release relay RR of the selected cord selector is energized from battery through the winding of relay RR, conductor 20, normal contact 21 of the test relay T, conductor S^1, contacts 8, wiper 5, conductor S, normal contact 9, relay CO, conductor 2, through the substation, conductor 1, normal contact 10 of relay CO, conductor T, wiper 4, contact 7, conductor T^1 to ground at normal contact 22. Upon energization of relay RR a circuit for the primary relay PR is established traced from battery through the winding of PR, alternate contact 23 of RR to ground at normal contact 24 of the primary off-normal contacts PON. The energization of relay PR closes a circuit for the primary magnet PM which may be traced from the ungrounded pole of the generator G^1 through the winding of magnet PM, alternate contact 25 to ground. The energizations of the primary magnet PM step the ground test wiper GT to select an idle group of cord circuits. Upon the first step of wiper GT, the primary off-normal contacts PON assume their alternate position interrupting the initial energizing circuit of the relay PR, but assuming the first contacts encountered are busy, another energizing circuit for the relay PR is established from battery, through the winding of relay PR, its alternate contact 26, conductor 27, to ground at other group contacts that are busy over which group test wiper passes in selecting an idle group of cord circuits.

As soon as the group test wiper GT finds an ungrounded contact, the energizing circuit for the relay PR is interrupted, deenergizing it, the said deënergization of re-

lay PR opening the circuit of primary magnet PM arresting the movement of the wiper GT. Also, upon the deënergization of the relay PR an energizing circuit for the secondary relay SR is established traced from battery through the winding of SR, conductor 28, alternate contact 29 of PON, normal contact 30 of the secondary off-normal contacts SON to ground at normal contact 25. Upon the energization of relay SR a circuit for the secondary magnet SM is closed, traced from the ungrounded pole of the generator G^2 through the winding of magnet SM to ground at alternate contact 31. Upon the energization of magnet SM the wipers 32, 33, 34 are stepped up to select an idle cord circuit. Upon the first step of the wipers 32, 33, 34, the secondary off-normal contacts SON assume their alternate positions interrupting the initial energizing circuit of the relay SR but assuming the first contact encountered is busy, another circuit is established from battery through the relay SR, conductor 28, alternate contacts 39, 40 conductor 41 to grounded contacts 36 over which the wiper 32 passes, thus the wipers 32, 33, 34 are stepped until private wiper 32 finds an ungrounded contact which opens the circuit for the secondary relay SR arresting further secondary movement of the wipers 32, 33, 34. Upon the deënergization of relay SR an energizing circuit for the relay T is established from battery through the winding of the relay T, alternate contact 42, conductor 43 to ground at normal contact 31, contacts 22 and 21 assuming their alternate positions and establishing the continuity of the talking conductors to the selected cord circuit D.

Upon extension of the calling line to the idle cord D, an energizing circuit for the answering supervisory relay AS is established from battery through the right hand winding of the relay AS, conductor S^2, contacts 38, wiper 34, alternate contact 21, conductor S^1, contacts 8, wiper 5, normal contact 9, conductor 2, conductor 1, normal contact 10 conductor T, wiper 4, contacts 7, conductor T^1, alternate contact 22, wiper 33, contacts 37, conductor T^2 to ground through the left hand winding of the relay AS, energizing the relay AS. Upon energization of AS, its contacts assume their alternate positions closing a circuit for the group busy relay GBR traced from battery through the winding of GBR alternate contact 49 to ground, energizing the relay GBR and making the particular cord circuit busy putting a ground on the private contact, said ground being extended to said contact from alternate contact 49 of AS through alternate contact 48 of GBR, conductor 47, to said private contact. (Also upon energization of relay AS its alternate contact 44 is closed lighting the supervisory or calling lamp L, the circuit of which may be traced from battery through the lamp L, alternate contact 44 to ground at normal contact 45.) Relay T upon its said energization opens the circuit for relay RR but the relay RR being slow to release holds its armature attracted until another circuit is established for it which may be traced from battery through the relay RR, conductor 20, alternate contact 46, normal contact 40, conductor 41, wiper 32, contacts 36, conductor 47, alternate contact 48 of the group busy relay GBR to ground at alternate contact 49 of the answering supervisory relay AS. The relay GBR, it will be remembered was energized upon the energization of the relay AS, which occurred upon extension of the calling line to cord D.

The operator at O observing the signal L throws the listening key LK to ascertain the wants of the subscriber at substation A. Assuming now that the substation E is wanted, the operator tests the called line as to its idle or busy condition by placing the tip of the plug P against the sleeve of the jack J^1 and if the line is busy the sleeve of the jack J^1 is at different potential than the plug tip and the operator receives the usual click in her head receiver.

Assuming that the line L is idle, there is no testing difference in potential and the operator at O receiving no busy click inserts the plug P into the jack J^1. This operation closes an energizing circuit for the test relay TR of the cord circuit and the cut-off relay CO^1 of the individual switch B^1 with which the called line is associated. This may be traced from battery through the cut-off relay CO^1, conductor 51, normal contact ON^1, the ring contacts of the jack J^1 and the plug P, conductor 52, the winding of the test relay TR to ground. This energizes the relays TR and CO^1. Upon the energization of the relay TR, contact 45 assumes its alternate position, removing the ground from the supervisory lamp L, effacing said lamp, and also closing a circuit for the calling supervisory lamp L^1, this circuit being traced from battery through the lamp L^1, normal contact 53, alternate contact 45 to ground lighting the said lamp L^1, it remaining lighted until the called-for subscriber at substation E answers. The operator now throws her ringing key RK connecting ringing current from the ungrounded pole of generator RG, through the upper alternate contact of the ringing key RK, the tip contacts of the plug P^1 and jack J^1, conductor 1^1, the call bell and condenser of the substation E, conductor 2^1, the ring contacts of the jack J^1 and the plug P to ground at the lower alternate contact of the ringing key RK. When the called subscriber answers, the calling supervisory relay CS is energized which circuit is traced

from battery through the right hand winding of the relay CS, conductor S^2 to the sleeve contacts of the plug P and jack J^1, conductor 2^1, through the substation, conductor 1^1, tip contacts of the jack J^1, and plug P, conductor T^2, alternate contact 54, through the left hand winding of relay CS to ground, energizing the relay CS. Upon energization, its contact 53 is interrupted, opening the circuit of the lamp L^1 and effacing it, notifying the operator that a response has been secured from the called substation.

Release.—The subscribers at substations A and E having finished conversation, replace their receivers upon their respective switch-hooks opening the energizing circuits of the relays AS and CS. The relay AS deënergizing, closes an energizing circuit for the lamp L from battery through the lamp L, normal contact 44 to ground at alternate contact 45 lighting the lamp L. The relay CS deënergizing, closes an energizing circuit for the lamp L^1 from battery through the lamp L^1, normal contact 53 to ground at alternate contact 45, lighting the lamp L^1. The operator observing the two lights knows that the subscribers have replaced their receivers and removes the plug P from the jack J^1. This opens the series circuit of relays TR and CO^1. The relay TR deënergizes and contact 45 assumes its normal position effacing the lamps L and L^1. Contact 57 assumes its normal position opening the circuits of the relay GBR of the cord circuit and relay RR of the cord selector. The relay RR deënergizing, closes an energizing circuit for the relay SR which is traced from battery through said relay SR, conductor 28, alternate contacts 29, 30, conductor 60 to ground at normal contact 61. Upon the energization of relay SR, an energizing circuit is closed for the secondary magnet SM, being traced from the ungrounded pole of generator G^2 to ground, at alternate contact 31. The ensuing operation of the secondary magnet SM steps the wipers 32, 33, 34 in a vertical direction beyond the last contacts of the group, from which position the wipers will be restored to normal by spring tension as described. When the relay SR energizes, it opens the circuit of the relay T at contact 31, opening the talking conductors at contacts 46 and 21 of relay T during restoration. Primary off-normal contacts PON now assume their normal position, opening the alternate contact 29 and interrupting the circuit of SR. Relay SR deënergizes opening the circuit of SM rendering said magnet inert. The secondary off-normal contacts SON of course also assume their normal position when the wiper comes to rest thus placing all of the apparatus of the cord selector at normal and rendering it available for other connections.

Following the restoration of the cord selector switch C, switch B is restored this being brought about by the interruption of alternate contact 24 of PON of switch C, thus causing the deënergization of the line relay LR which was held up through said alternate contact of PON. Upon restoration of LR, its normal contact 11 is closed establishing an energizing circuit for CO which is traced from battery through CO alternate contact of ON to ground at normal contact 11 of LR. Thereby CO attracts its armature, withdrawing the check pawl 63 from engagement with the ratchet on the shaft of switch B, and as LR is deenergized the pawl 62 associated therewith is withdrawn from the ratchet, the wipers 3, 4 and 5 thereby restoring to normal. Upon restoration of the wipers, ON assumes its normal position opening the energizing circuit of CO restoring it and now the switch being normal the line of substation A is available for use in establishing other connections.

I have preferably arranged my invention so that the subscriber at the calling substation has control of the restoration of the apparatus used in extending a call to an operator's link circuit up to the time of the operator answering the call by connecting her listening key in circuit. That is, my system is so arranged that should a calling subscriber replace his receiver upon its switch-hook prior to the time the operator connects the associated listening key across the selected cord circuit, the apparatus will be restored and the calling lamp L effaced. After the listening key LK has been connected, or while the plug P is in connection with a called line, the restoration of the apparatus is controlled by the operator.

Assuming that a call has been extended from substation A to cord circuit D in a manner as previously described, and before the operator has connected the listening key LK in circuit the subscriber at A replaces his receiver upon its switch-hook. This interrupts the circuit for answering supervisory relay AS which deënergizes interrupting the locking contacts 49 and allowing the restoration of relay GBR and RR to effect the restoration of the switches C and B. Of course after the operator has connected the listening key LK, or while the plug P is inserted into the jack J^1 of a called line, a locking ground from LK or alternate contact 57 of TR is effective to hold relays GBR and RR independent of the ground from alternate contact 49 of AS.

With the above arrangement the accidental winking of a switch-hook although it may extend a connection, allows for the re-

lease of such connection and therefore does not permit the tying up of the operator's cord circuits by false calls. Or, a subscriber after removing his receiver and extending a call may decide no connection is wanted, and if the receiver is replaced before the operator answers, the lamp L is effaced and the apparatus restored.

While I have referred to a particular type of cord selector, and one which is of the so-called two-dimension type, it is to be understood that other forms of cord selectors may be used. Neither do I desire to be limited to the particular line switch shown as other forms of such switches may be used. For the above reasons I do not desire to be limited to the exact structure as shown and described but aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent is:

1. A call distributing system comprising telephone lines, automatic line switches for said lines, cord selectors multiply connected to terminals of said line switches, operators' cord circuits, and means controllable over a calling line for causing its line switch to test its terminals progressively to automatically select an idle cord selector and said cord selector to thereafter automatically select an idle cord.

2. A call distributing system comprising telephone lines, one-dimension automatic line switches for said lines, two-dimension cord selectors multiply connected to terminals of said line switches, operators' cord circuits, means controllable over a calling line for causing its line switch to automatically select an idle cord selector, and means whereby said cord selector thereafter automatically selects an idle cord.

3. A call distributing system comprising telephone lines, one-dimension automatic line switches for said lines, two-dimension cord selectors accessible by said line switches, operators' cord circuits accessible by said cord selectors, means controllable over a calling line for causing its line switch to automatically select an idle cord selector, and means whereby said cord selector thereafter automatically selects an idle cord.

4. A call distributing system comprising telephone lines, one-dimension automatic line switches for said lines, two-dimension cord selectors having terminals divided into groups, operators' cord circuits connected to said terminals, means controllable over a calling line for causing its line switch to automatically select an idle cord selector, and means whereby said cord selector thereafter tests said terminals by groups and individually to select an idle one of said cord circuits.

5. A call distributing system comprising telephone lines, one-dimension automatic line switches for said lines, two-dimension cord selectors multiply connected to terminals of said line switch and having terminals divided into groups, operators' cord circuits multiply connected to said selector terminals, means controllable over a calling line for causing its line switch to automatically select an idle cord selector, and means whereby said cord selector thereafter tests said terminals by groups and individually to select an idle one of said cord circuits.

6. A telephone system comprising telephone lines, operators' cord circuits distributed among operators' positions for extending the circuits of said lines, individual selectors for said lines, cord selectors accessible from the line switches, and means responsive to initiation of a call over any of said lines to cause progressive operation of line and cord selectors successively to connect a calling line through said operating selectors to the first idle cord circuit.

7. A telephone system comprising telephone lines, operators' cord circuits distributed among operators' positions for extending the circuits of said lines, individual progressive selectors for said lines, progressive cord selectors accessible from the line switches and having access to cord circuits of a plurality of operators' positions, and means responsive to initiation of a call over any of said lines to cause progressive operation of line and cord selectors successively to connect a calling line through said operating selectors to the first idle cord circuit.

8. A telephone system comprising a group of telephone lines, operators' cord circuits distributed among operators' positions for extending the circuits of said lines, individual progressive selectors for said lines, cord selectors multiply connected to the terminals of the line switches, said cord circuits being multiply connected to terminals of the cord selectors, and means responsive to initiation of a call over any of said lines to cause progressive operation of line and cord selectors to connect a calling line through said operating selectors to an idle cord circuit.

9. A telephone system comprising telephone lines, operators' cord circuits distributed among operators' positions for extending the circuits of said lines, individual progressive selectors for said lines, cord selectors multiply connected to the terminals of the line switches, said cord selectors having groups of terminals to which the cord circuits are multiply connected, and means responsive to initiation of a call over any of said lines to cause operation of a line switch to select an idle cord selector and operation of said cord selector to select an

...e group and thereafter the first idle cord circuit of the group.

10. A telephone system comprising telephone lines, operators' cord circuits distributed among operators' positions for extending the circuits of said lines, individual selectors for said lines, cord selectors accessible from the line switches, and means responsive to initiation of a call over any of said lines to cause progressive operation of line and cord selectors from a zero or normal position successively to connect a calling line through said operating selectors to the first idle cord circuit.

11. A telephone system comprising telephone lines, operators' cord circuits distributed among operators' positions for extending the circuits of said lines, progressively operable forwardly selecting switches for interconnecting calling lines and the cord circuits, and means responsive to initiation of a call over any of said lines to cause progressive operation of a plurality of said selectors successively for connecting the calling line to an idle cord circuit.

Signed by me at Chicago, county of Cook and State of Illinois, in the presence of two witnesses.

CHARLES S. WINSTON.

Witnesses:
G. E. MUELLER,
M. R. ROCHFORD.