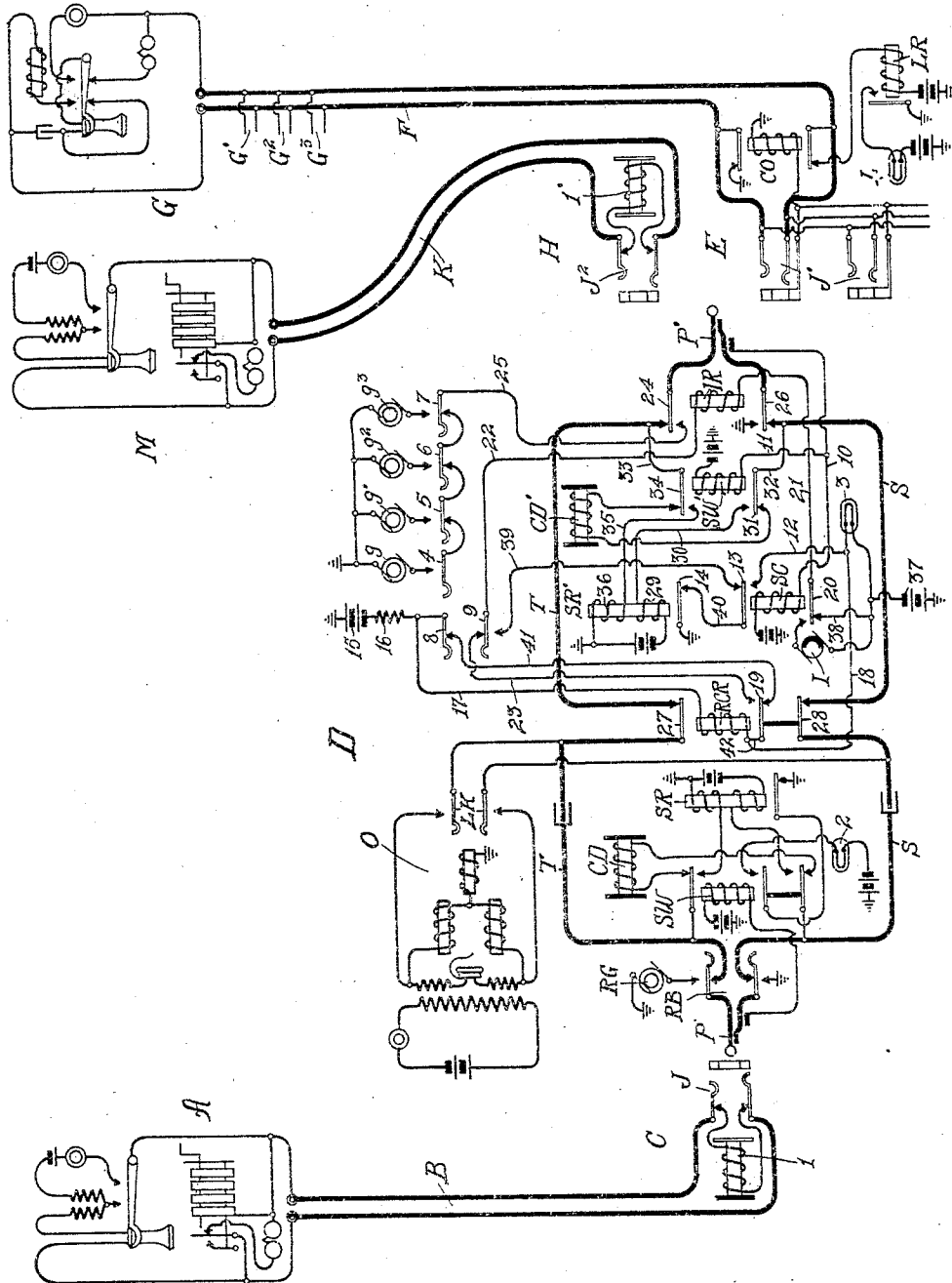


C. S. WINSTON.
TELEPHONE SYSTEM.
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TELEPHONE SYSTEM.

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To all whom it may concern:

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

My invention relates to telephone systems and has to do more particularly with circuits such as are used for interconnecting lines of like or different characters, for instance lines of magneto and common battery type, my invention being more particularly directed to means for giving automatic control of the ringing when signaling a substation of a common battery line, and operator controlled means when signaling a magneto substation.

An object of my invention is to provide an improved and simplified circuit arrangement of the character referred to which is positive in operation.

In illustrating my invention as shown in the accompanying drawing, a universal cord circuit D is provided for interconnecting magneto substations as A and G, and common battery substations as G, interchangeably. For the purpose of illustration we will assume an exchange with a number of magneto lines B and K, and common battery lines F terminating at a switchboard equipped with universal cord circuits D.

Referring now more in detail to my invention as illustrated, it comprises the magneto substation A connected by the line B to the jack J at the central office, said jack having a signal I connected in circuit therewith. To the right of the drawing is shown a magneto substation M similar to the substation A connected by the line K to the central office terminal H similar to that at C. I have also shown a four party common battery line F, the common battery substation G connected to said line, the other three substations being indicated at G¹, G², G³. Substations G, G¹, G², G³ terminate at the exchange in a common battery line circuit E. This line circuit E comprises a cut-off relay CO, line relay LR, lamp L, and multiple jacks J¹.

Cord circuit D comprises the answering plug P and the calling plug P¹, said plugs being conductively united by the heavily marked tip conductor T and the heavily

marked sleeve conductor S with the condensers interposed. The answering end of the cord circuit terminates in an answering plug P connected to the ring back key RB which is thrown by the operator to connect the ringing generator RG to the line. The clearing out drop CD is bridged across the line and operated by current from the hand generator of the magneto substation. The switching relay SW and the supervisory relay SR are operated to control the supervisory lamp 2 when the answering plug P is connected to a jack leading to a common battery substation. The listening key LK is thrown by the operator to connect her operator's set O to inquire the wants of the calling subscriber. The operator's set is common to and adapted to be connected to any one of a number of cord circuits D.

The sleeve supervisory relay SC and the supervisory relay SR¹ are operated to control the calling supervisory lamp 3. The switch relay SW¹ operates when the plug P¹ is inserted into the jack J¹ to close its contacts so that the relay SR¹ when operated by the called subscriber taking the receiver from the switch-hook has its energizing circuit continued by said closed contacts of relay SW¹.

For ringing purposes I preferably employ four generators g , g^1 , g^2 , g^3 , each one being of a different frequency, while the bells of the party line F are tuned to correspond to the frequencies of the said generators. In ringing the called-for subscriber one of the four ringing contacts 4, 5, 6 or 7 is actuated depending upon the frequency of the called subscriber's bell. The ringing contacts have three positions, a normal position, an intermediate position and a fully depressed position. In the intermediate and fully depressed positions the contacts 4, 5, 6 or 7 are held closed, and in the fully depressed position, master contacts 8 and 9 are also operated. A ringing contact remains in its locked position until another ringing contact is fully depressed at which time the locked contact is restored to normal. The ringing of the bell of a called-for magneto substation is also performed by any one of the four generators g , g^1 , g^2 , g^3 , but the key is manually held in its fully depressed position. The ringing of the called-for common battery substation bell is intermittent and this intermittent ringing is se-

cured by means of the interrupter relay IR this relay being adapted to have its energizing circuit opened and closed by means of the interrupter I. This interrupter I is
 5 connected to the relay IR through the contacts of the relay SC and the ringing control relay RCR. The ringing control relay RCR is actuated when one of the ringing keys is fully depressed, operating the master contacts 8 and 9, the opening of contact
 10 8 removing the shunt from the relay RCR. When calling a magneto substation, the bell is rung steadily, and this ringing is obtained by fully depressing a key thus operating the master contacts, thereby energizing
 15 the relay IR to connect ringing current to the magneto line.

Operation: Assuming now that a subscriber at the magneto substation A desires a connection with a common battery substation as G, the subscriber at A operates his hand generator thereby throwing drop 1 at the central office. The operator observing the signal inserts the plug P into the
 20 jack J and throws the listening key LK to connect the operator's set O to inquire the wants of the calling subscriber. The sleeve of the jack J is dead having no connections with any apparatus and therefore none of
 25 the apparatus at the answering end of the cord circuit is operated, thus leaving drop CD in bridge of the calling line. The operator having received the number and assuming that it is the substation G of the party
 30 line F, she takes the plug P¹ and tests as to the idle or busy condition of the wanted line. The test is made by touching the tip of the plug P¹ to the sleeve of the jack J¹. If the line is idle ground will be connected to the
 35 sleeve of the jack J¹ from the cut-off relay CO of the line circuit E. The sleeve being at ground potential the operator does not receive the customary busy click through her head receiver but if the line is busy and the
 40 tip of the plug is placed on to the sleeve of the jack J¹ battery will be connected through the relay SC of another cord circuit through the sleeve contacts of the plug and jack and through the cut-off relay to ground.
 45 This raises the potential of the sleeve of jack J¹ and when the tip touches the sleeve the operator will receive the customary busy click through her head receiver notifying her that the wanted line is busy. Assuming
 50 that the wanted line is idle, the operator inserts the plug P¹ into the jack J¹, closing an energizing circuit for the relay SC, relay SW¹ and the cut-off relay CO of the line circuit E traced from battery through the
 55 relay SC, conductor 10, sleeve contacts of the plug P¹ and jack J¹ through the cut-off relay CO to ground energizing the two relays in series. The relay SW¹ is also energized its circuit being traced from battery through
 60 the relay SW¹, conductor 11, conductor 10,

sleeve contacts of the plug P¹ and jack J¹, through the cut-off relay CO to ground energizing the relay SW¹. Upon the energization of the relay SC the supervisory lamp 3
 70 is lighted from battery 37 through the lamp 3, conductor 12, alternate contact 13 of relay SC to ground at normal contact 14 of relay SR¹ lighting the lamp 3, lamp 3 remaining
 75 lighted until the called subscriber answers. The closing of alternate contact 13 also connects ground from normal contact 14 in circuit with the winding of relay RCR and
 80 battery 15, but relay RCR does not energize due to the shunt circuit about its winding through its normal contact 19 and normal
 85 contact 8. The operator having plugged into the wanted line, and assuming that the bell of the desired subscriber is tuned to correspond to the frequency of the generator
 90 g, the operator depresses the ringing key 4 fully, thereby also momentarily closing the master contacts 8 and 9. As soon as the pressure is released from the key 4 the master
 95 contacts are restored to normal, but contact 4 remains closed. As soon as the contacts 8 and 9 assume their alternate positions by reason of the key 4 being fully depressed,
 100 the normal contact of master contact 8 is opened removing the shunt from the relay RCR which is then energized from battery 15, through resistance 16, conductor 17,
 105 winding of relay RCR conductor 18, alternate contact 13 of relay SC to ground at normal contact 14 of relay SR¹ energizing the said relay RCR which remains energized
 110 due to the opening of the shunt circuit through its normal contact 19. The relay RCR upon energization closes the circuit through the interrupter relay IR traced
 115 from battery 37 through the interrupter I, alternate contact 20 of relay SC, conductor 21, the winding of relay IR, conductor 22, normal contact 9, conductor 23, alternate
 120 contact 19 of relay RCR, conductor 18, conductor 12, alternate contact 13 of relay SC to ground at normal contact 14 of relay SR¹ energizing the relay IR. The relay IR is
 125 now responsive to the interruptions of its circuit at interrupter I and due to the intermittent energizations of relay IR, the contact 24 of relay IR connects the generator g
 130 to the tip conductor T, thus intermittently ringing the bell of the called subscriber. The operator having now closed the contact 4 and as soon as the relay IR is energized,
 135 a circuit for ringing current is established from the ungrounded pole of generator g, alternate contact 4, normal contacts of ringing contacts 5, 6, 7, conductor 25, alternate
 140 contact 24 of relay IR, tip conductor T to the tip contacts of the plug P¹ and jack J¹, line F including condenser and call bell of the substation G back over the ring contacts
 145 of the jack J¹ and plug P¹ to ground at alternate contact 26. The relay IR now

periodically connects ringing generator g to the tip conductor T , of the cord circuit until the called subscriber answers. The contacts 27, 28 of the relay RCR are held in their alternate position to keep the ringing current from the answering end of the cord circuit so that it will not be heard by the calling subscriber. When the called subscriber answers, and when the relay IR is in its de-energized condition, a circuit is closed through the relay SR^1 traced from battery through the lower winding 29, conductor 30, alternate contact 31 of relay SW^1 , which it will be remembered was energized when the plug P^1 was inserted in the jack J^1 , conductor 32, normal contact 26, the ring contacts of the plug P^1 and jack J^1 through the substation back through the tip contacts of the jack J^1 and the plug P^1 , normal contact 24, conductor 33, alternate contact 34 of relay SW^1 , conductor 35 to ground through the upper winding 36 of relay SR^1 energizing the said relay. The energization of relay SR^1 opens normal contact 14 removing the ground and effacing the supervisory lamp 3 notifying the operator that the called subscriber has answered. The opening of ground at contact 14 of relay SR^1 also breaks the locking circuit for the relay RCR which deenergizes the said relay, its armature falling back breaking alternate contact 19 opening the circuit of the relay IR restoring it to normal and thereby interrupting the ringing current. The armature of the relay RCR falls back closing its normal contacts 27, 28 restoring the continuity of the talking conductors T and S . The subscribers are now connected in conversational circuit which may be traced over the heavily marked conductors. When the subscribers have finished their conversation they restore their respective receivers to the switch-hooks. The subscriber at A operates his hand generator, the current throwing the clearing out drop CD and notifying the operator that the subscriber at A has finished conversation. The operator then removes the plug P from the jack J . The subscriber at G having replaced his receiver, the circuit of relay SR^1 is interrupted, deenergizing said relay and lighting the supervisory lamp 3 to notify the operator that the subscriber has replaced his receiver. The operator then disconnects the plug P^1 from the jack J^1 removing ground from the relays SC and SW^1 deenergizing them and also deenergizing the cut-off relay CO of the line circuit E , the deenergization of the relay SC effacing the supervisory lamp 3. The cord circuit D and the lines B and F having been restored to normal, are now available for use in establishing other connections.

Assuming now that the subscriber at A wishes to converse with the subscriber at magneto substation M , the subscriber at A operates his hand generator thereby throwing the drop 1 at the central office. The operator observing the signal inserts the plug P into the jack J and throws the listening key LK to connect the operator's set O to the line to inquire the wants of the calling subscriber. The sleeve of the jack J is dead having no connections with any apparatus, and therefore none of the apparatus at the answering end of the cord circuit is operated. Assuming now that the wanted subscriber is at the magneto substation M and that it is idle, the operator inserts the plug P^1 into the jack J^1 and as the sleeve of the jack J^1 is dead having no connection with any apparatus therefore none of the apparatus at the calling end of the cord circuit is operated, and drop CD^1 remains in bridge of the called line. To ring the magneto substation M the operator presses any one of the four ringing contacts 4, 5, 6 or 7. The ringing key used is fully depressed into its third position closing its ringing contact and also the master contacts 8 and 9. The only relay operated in the cord circuit D is the interrupter relay IR and its circuit may be traced from battery 37, conductor 38, normal contact 20, conductor 21, the winding of relay IR , conductor 22, alternate contact 9, conductor 39, normal contact 13 of relay SC , conductor 40 to ground at normal contact 14 of relay SR^1 energizing relay IR . Relay IR closes its alternate contacts 24, 26 connecting ringing current from the actuated ringing contact in bridge of the called line. The operator keeps the actuated key in its fully depressed position so as to operate the master contacts to keep the relay IR in its energized position. The ringing current can be traced from the ungrounded pole of the generator g^1 , assuming of course that it was the ringing contact 5 which was depressed, the alternate contact 5, the normally closed contacts 6 and 7, conductor 25, alternate contact 24, out over the line to the called subscriber, back to ground at alternate contact 26 thus steadily ringing the bell of the called substation. The operator may listen until the called subscriber answers whereupon she releases the fully depressed ringing contact restoring it to its locking or indicating position, the master contacts restoring to their normal position breaking the circuit of the relay IR at alternate contact 9. The relay IR deenergizing, its contacts 24 and 26 assume their normal position establishing the continuity of the talking conductors T and S . The subscribers are now in conversational circuit traced over the heavily marked conductors. When the subscribers are through talking they replace their receivers upon their respective switch-hooks. The subscriber at A operates his hand generator, the current throwing the clearing out drop CD at the

central office notifying the operator that the calling subscriber has finished conversation. The subscriber M also operates the hand generator throwing the clearing out drop CD¹ notifying the operator that the called-for subscriber is also through talking. The operator disconnects the plugs P and P¹ from the jacks J and J². The cord circuit D and the lines B and K are now available for other connections.

The relay SW, the supervisory relay SR and the supervisory lamp 2 of the answering end of the cord circuit D are used when the calling substation is a common battery line similar to F and connected to the central office to a line circuit similar to E. The relays SA and SR operate when the plug P is inserted in a jack similar to J¹ preventing the lamp 2 from lighting. When the subscriber replaces his receiver upon the switch-hook the relay SR deenergizes lighting the lamp 2 to notify the operator that the conversation has been finished. The plug P is then disconnected, deenergizing the relay SA and effacing the lamp 2.

While I have shown a plurality of batteries and grounds in the circuit of my system it is to be understood that the different batteries and grounds may be one and are located at the central office.

I do not wish to be limited to the exact structure as illustrated as many modifications and changes can be made by those skilled in the art without departing from the spirit of the invention, but wish to claim all that which comes within the spirit and scope of the appended claims.

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

1. A telephone system comprising a universal cord circuit adapted for interconnecting different types of telephone lines, supervisory apparatus for said circuit, a ringing key for said cord circuit, automatic ringing apparatus for said cord circuit, manual ringing apparatus for said cord circuit, said key when actuated being adapted to connect manual or automatic ringing apparatus in operative relation with the cord circuit according to the type of line connected with.

2. A telephone system comprising a universal cord circuit adapted for interconnecting magneto and common battery telephone lines, supervisory apparatus for said circuit, a ringing key for said cord circuit, automatic ringing apparatus, manual ringing apparatus, said key when actuated being adapted to connect either the manual or automatic ringing apparatus in operative relation with the cord circuit according to whether the line connected with is magneto or common battery respectively.

3. A telephone system comprising a universal cord circuit adapted for interconnecting different types of telephone lines, super-

visory apparatus for said circuit, a ringing key for said cord circuit, automatic ringing apparatus, manual ringing apparatus, said key when actuated being adapted to connect the manual ringing apparatus and render the automatic ringing apparatus ineffective upon connection made with only one of the types of telephone lines.

4. A telephone system comprising a universal cord circuit adapted for interconnecting different types of telephone lines, supervisory apparatus for said circuit, a ringing key for said cord circuit, automatic ringing apparatus, manual ringing apparatus, said key when actuated being adapted to connect the automatic ringing apparatus and render the manual ringing apparatus ineffective upon connection made with only one of the types of telephone lines.

5. A telephone system comprising a universal cord circuit adapted for interconnecting magneto and common battery telephone lines, supervisory apparatus for said circuit, a ringing key for said cord circuit, automatic ringing apparatus, manual ringing apparatus, said key when actuated being adapted to connect the manual ringing apparatus and render the automatic ringing apparatus ineffective upon connection made with a magneto line circuit only.

6. A telephone system comprising a universal cord circuit adapted for interconnecting magneto and common battery telephone lines, supervisory apparatus for said circuit, a ringing key for said cord circuit, automatic ringing apparatus, manual ringing apparatus, said key when actuated being adapted to connect the automatic ringing apparatus and render the manual ringing apparatus ineffective upon connection made with a common battery line only.

7. A telephone system comprising a universal cord circuit adapted for interconnecting different types of telephone lines, supervisory apparatus for said circuit, a ringing key for said cord circuit, ringing apparatus, and control means for said ringing apparatus differently operated according to the type of line connected with whereby when said key is actuated one type of line has automatic control of the ringing apparatus and the other type of line renders the ringing apparatus manually controllable by the operator.

8. A telephone system comprising telephone lines terminating in line circuits of different characters, a common source of current, one type of line circuit having its jack connected to a terminal of said source and the other type of line circuit having its jack on open circuit, a universal cord circuit for interconnecting such lines, supervisory apparatus for said cord, and ringing control apparatus for said cord circuit differently operated according to the line connected with

whereby when connection is made with one of said open circuit jacks said ringing apparatus is rendered manually controllable by the operator and when connection is made with one of said battery connected jacks said ringing apparatus is rendered automatically controllable over the called telephone line.

9. A universal cord circuit for interconnecting common battery and magneto telephone lines, supervisory apparatus, a ringing key, ringing apparatus, and circuit connections between said key and apparatus whereby automatic or manual control of such apparatus is effected according to the character of line connected with.

10. A telephone system comprising telephone lines of different character, an operator's link circuit for connecting with said

lines, a relay for applying ringing current to said link circuit, a ringing key, and circuit connections between said key and relay whereby when connection is made with a line of one character the operation of said key will cause automatic control of said relay over such line and if a connection is made with a line of another character manual control of said relay by said key is effected.

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,
B. O'BRIEN.