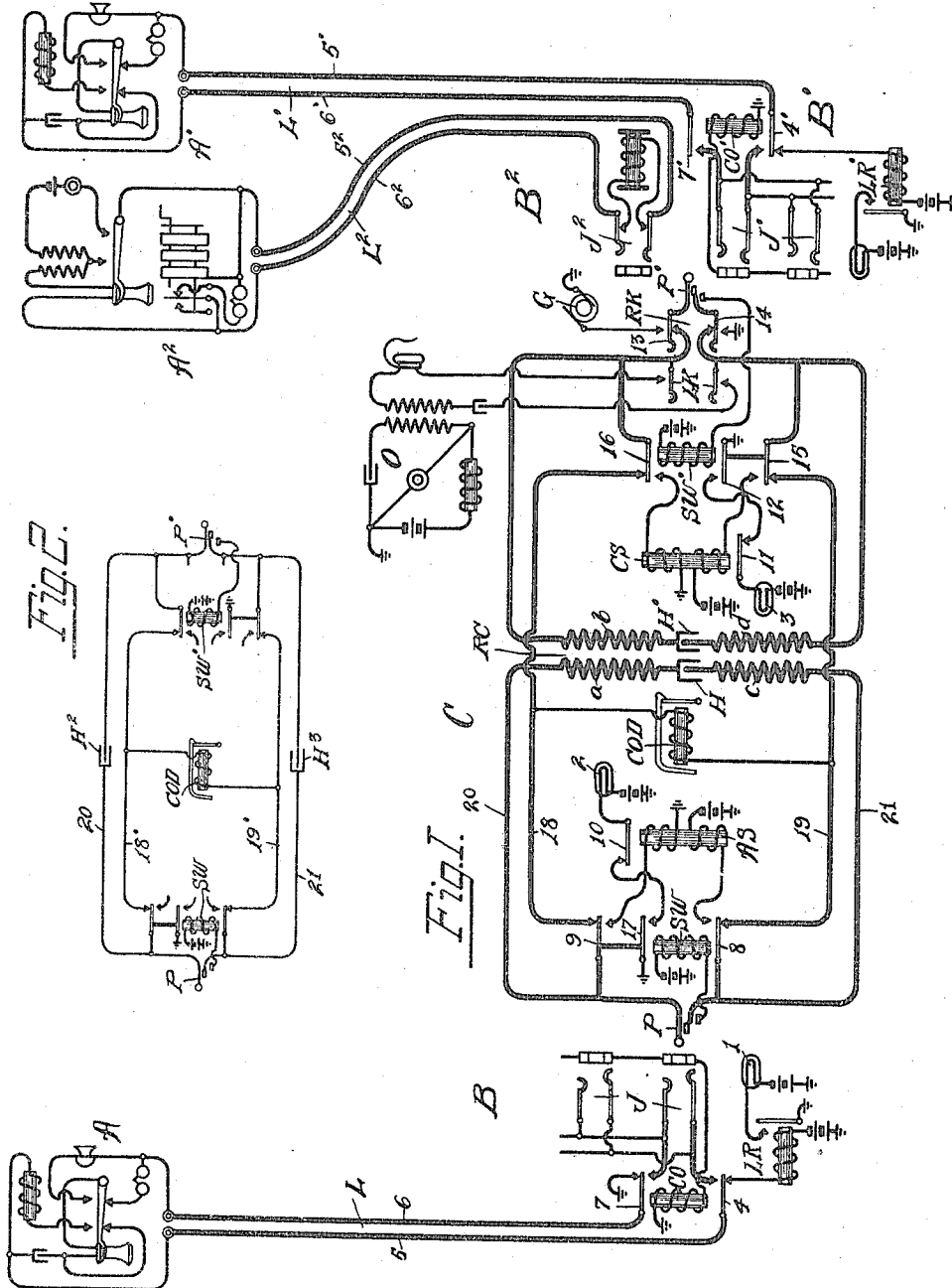


R. I. UTTER.
TELEPHONE SYSTEM.
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Patented Sept. 5, 1916.



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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, RICHARD I. UTTER, a citizen of the United States of America, residing in Chicago, county of Cook, 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 systems wherein telephone lines of like and unlike characters are interconnected, for instance, magneto telephone lines and common battery telephone lines.

An object of my invention is to provide a system of the above character in which a single clearing out drop may be associated with either one or both the answering and calling ends of the cord circuit. The clearing out drop is preferably used at the called end if the called line is magneto and at the answering end if the calling line is magneto, in connection with both ends if both calling and called lines are magneto.

Another object of my invention is to provide a system having improved and simplified circuit arrangements which are positive in operation.

In the accompanying drawing I have illustrated a circuit embodying my invention and have shown only sufficient apparatus to illustrate the operation of the system and in which:

Figure 1 illustrates the apparatus employed in connecting like and unlike characters of lines; Fig. 2 illustrates a modification of my invention.

Referring now in general to the preferred embodiment of my invention as illustrated, it comprises the well-known common battery substation A connected by line L to a three-wire common battery line circuit B, which comprises a line relay LR energized upon initiation of a call, line lamp 1 lighted upon the energization of relay LR, and a cut-off relay CO, which when energized interrupts circuit of LR to efface lamp 1, and connects the multiple jacks J. The cord circuit C comprises an answering plug P, and a calling plug P¹. A repeating coil RC is also associated with the cord circuit C, being made up of the windings *a*, *b*, *c* and *d*, the condensers H and H¹ being interposed between the opposite ends of the circuit in a well-known manner. At the answering end

of cord circuit C, I provide a switching relay SW which is energized when the plug P is inserted in the jack J, of a calling common battery line. An answering supervisory relay AS is also provided which energizes when the plug is in the jack and the receiver of the calling substation is off the hook, and a supervisory lamp 2 is associated with the answering end of the cord circuit C. A clearing out drop COD is provided being used as a clearing out signal for the magneto lines the same drop being used as a clearing signal for disconnect if the called station is magneto, or if the calling station is magneto, or if both calling and called are magneto.

At the calling end of the cord circuit C, I provide a switching relay SW¹ which is energized when the plug P¹ is inserted into a jack of a called common battery line. A calling supervisory relay CS is also provided which engages when the called substation answers and a supervisory lamp 3 is provided which remains lighted until the called substation answers. A listening key LK is also associated with the cord circuit being thrown to place the operator's set O in circuit with the cord. A ringing key RK is provided which when thrown places the ringing generator G in circuit to signal the called substation. To the right of the drawing I illustrate a common battery substation A¹ similar to the substation A, the substation A¹ being connected by the line L¹, with a three-wire common battery line circuit B¹ similar to that illustrated at B. I also illustrate a magneto substation A² which is connected by the line L² to magneto line circuit B².

Assuming now that connection is to be established between two common battery substations, the subscriber at substation A removes his receiver from the switch-hook, thus energizing the line relay LR, said circuit being traced from the battery through the winding of relay LR, normal contact 4 of relay CO, line limb 5, through the substation, line limb 6 to ground at normal contact 7 of relay CO. The energization of relay LR closes a circuit for the line lamp 1, and the operator noting the signal inserts the plug P into the jack J and throws the listening key LK to ascertain the wants of the calling subscriber. When plug P is in-

serted into the jack J an energizing circuit for the cut-off relay CO and switching relay SW is established which is traced from battery through winding of switching relay SW, the sleeve contacts of the plug P and jack J, winding of relay CO to ground energizing the cut-off relay CO and the switching relay SW in series. The answering supervisory relay AS is also energized, said circuit being traced from battery through the lower winding thereof, alternate contact 8, the registering contacts of the plug P and jack J, alternate contact 4, line limb 5 through the substation, line limb 6, alternate contact 7, the tip contacts of the jack J and plug P, alternate contact 9, through the upper winding of the relay AS to ground, energizing the relay AS and opening its normal contact 10 to prevent the supervisory signal 2 from lighting. Any well known method of testing the called line may be used.

Assuming now that the called substation is idle, the operator inserts the plug P¹ into the jack J¹ thereby energizing the switching relay SW¹ and the cut-off relay CO¹ over a circuit traced from battery through the winding of switching relay SW¹, the sleeve contacts of the plug P¹ and jack J¹ through the winding of relay CO¹ to ground. Upon the energization of the relay SW¹ an energizing circuit for the supervisory lamp 3 is established which may be traced from battery through the lamp 3 normal contact 11 of the calling supervisory relay CS, alternate contact 12 of the relay SW¹ to ground lighting said lamp 3, which remains lighted until the calling subscriber answers. The operator then throws the ringing key RK to signal the called for substation, said ringing circuit being traced from the ungrounded pole of the generator G, alternate contact 13 of the ringing key RK, the tip contacts of the plug P¹ and jack J¹, alternate contact 7¹, line conductor 6¹, condenser and call bell of the called substation, line conductor 5¹, alternate contact 4¹, ring contacts of the jack J¹, and plug P¹ to ground at alternate contact 14. When the subscriber answers calling supervisory relay is energized this circuit being traced from battery through the lower winding thereof, alternate contact 15, normal contact 14, ring contacts of the plug P¹ and jack J¹, alternate contact 4¹, line conductor 5¹, through the substation, line conductor 6¹, alternate contact 7¹, tip contacts of the jack J¹ and plug P¹, normal contact 13, alternate contact 16 through the upper winding of relay CS to ground, energizing the calling supervisory relay CS and interrupting the circuit of the lamp 3, effacing the said lamp 3 and notifying the operator that the subscriber at A has answered. The substations A and A¹ are now in conversational circuit, this talking circuit being

traced over the heavily marked conductors including the repeating coil RC and the condensers H and H¹. The subscribers having finished conversation, the subscriber at substation A replaces his receiver upon the switch-hook, which act deenergizes the answering supervisory relay AS, to light the supervisory lamp 2, said circuit being traced from battery through the lamp 2, normal contact 10, alternate contact 17 to ground. The subscriber at A¹ replaces the receiver upon the switch-hook which act deenergizes the calling supervisory relay CS, thus closing a circuit for the supervisory lamp 3 which may be traced from the battery through the lamp 3, normal contact 11, alternate contact 12 to ground. The two supervisory lamps 2 and 3 being lighted indicate to the operator that the two subscribers have finished conversation, whereupon she removes the plugs P and P¹ from jacks J and J¹ deenergizing the switching relays SW and SW¹ placing cord circuit C in condition for setting up other connections. This removal of the plugs also restores the relays CO and CO¹ to normal.

Assuming now that a calling substation as A wishes connection with a magneto substation, such as A², the operation of this connection is the same up to the time that the operator plugs into the jack of the wanted line. To connect the magneto substation such as A², the operator inserts the plug P¹ into the jack J², but in this case switching relay SW¹ of the calling end of the cord circuit does not operate because the sleeve of the jack J² of the magneto line is dead. The operator then throws the ringing key RK, to signal the called-for substation, said ringing current being traced from the ungrounded pole of the generator G, alternate contact 13, the tip contacts P¹ and jack J², line conductor 6², the call bell of the called substation, line conductor 5², the ring contacts of the jack J² and plug P¹ to ground at alternate contact 14. The talking circuit may be traced over the heavily marked conductors, taking the same path as that of the talking circuit used in connecting the two common battery substations as described previously. In this case, the talking battery is supplied from the central source and from the local battery at A². It will also be noted that drop COD remains bridged across the called line. The subscribers at substations A and A² having finished conversation hang up their respective switch-hooks, the hanging up of the receiver at substation A deenergizes the answering supervisory relay AS, the closing of its normal contact 10 lighting the supervisory lamp 2. The subscriber at substation A² after replacing his receiver upon the switch-hook operates his hand generator to energize the clearing out drop COD. The operator noting the lighted lamp

2 and the thrown drop COD takes down the connection removing the plug P^1 from the jack J^2 , and the plug P from the jack J . The removal of the plug P from the jack J deenergizes the cut-off relay CO and switching relay SW. This places the cord circuit C in condition for setting up other connections.

Assuming now that two magneto subscribers wish to converse with each other, the magneto subscriber calling operates his hand generator to throw the signaling drop, whereupon the operator inserts the plug P into the jack associated with the calling magneto substation. The sleeve of the jack is dead and does not affect the switching relay SW, said switching relay SW remaining deenergized. The operator then throws her listening key LK to ascertain the wants of the calling subscriber. It being the magneto substation A^2 that is wanted, the operator inserts the plug P^1 into the jack J^2 , the relay SW¹ remaining deenergized by reason of the sleeve of the jack J^2 being dead. She then throws the ringing key RK to signal the called-for subscriber as before. The two switching relays SW and SW¹ remaining deenergized, the repeating coil and condensers are short circuited and the talking circuit between the two magneto substations is established over a circuit including the heavily marked conductors 18, 19. The subscribers having finished conversation, hang up their receivers upon their respective switch-hooks. They then operate their hand generators to throw the clearing out drop COD and the operator noting the thrown clearing out drop COD removes the plugs from the jacks and restores the drop COD, thus restoring the cord circuit C to normal placing the cord circuit in condition for setting up other connections.

Referring now to Fig. 2, I illustrate a modification of my invention using a cord circuit without a repeating coil and just having condensers H^2 and H^3 interposed in the talking circuit but using the same apparatus as in Fig. 1. The operation in connecting two common battery substations is the same as previously described, the talking path being over the outer conductors 20 and 21. When a common battery and a magneto substation are in circuit the talking circuit is the same as described in connection with Fig. 1, which is over the outer conductors. When two magneto substations are connected the switching relays remain deenergized short circuiting the condensers, H^2 and H^3 , the talking path then being over the inner conductors 18¹ and 19¹.

It will be apparent that many modifications can be readily made by those skilled in the art and I aim to apply my invention in other ways than shown, and therefore I

do not wish to be limited to the exact structure as shown but aim to cover all modifications as come within the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. A universal cord circuit for telephone systems comprising answering and calling connecting terminals, two sets of talking conductors normally uniting said terminals, electromagnetic switching mechanism associated with each of said terminals and adapted to be operated when connection is made with a telephone line of one character but not operated when connection is made with a line of another character, circuit connections controlled by said switching mechanisms whereby when two lines of one character are connected one set of talking conductors is effectively inductively connected between the terminals of said cord and when two lines of other but like character are connected the other set of talking conductors is effectively conductively connected between the terminals of said cord circuit, and means for supplying talking current to said cord circuit when one of said connections is established.

2. A universal cord circuit for telephone systems comprising answering and calling connecting terminals, two sets of talking conductors normally uniting said terminals, a switching relay associated with each of said terminals and adapted to be operated when connection is made with a telephone line of one character but not operated when connection is made with a line of another character, supervisory apparatus associated with each set of talking conductors, and circuit connections controlled by said relays whereby when two lines of one character are connected one set of talking conductors is effective and when two lines of other but like character are connected the other set of talking conductors is effective.

3. A universal cord circuit for telephone systems comprising answering and calling connecting terminals, two sets of talking conductors of different character normally uniting said terminals, a switching relay associated with each of said terminals and adapted to be operated when connection is made with a telephone line of one character but not operated when connection is made with a line of another character, circuit connections controlled by said relays whereby when two lines of one character are connected one set of talking conductors is effectively inductively connected between the terminals of said cord circuit, and when two lines of other but like character are connected the other set of talking conductors is effectively conductively connected between the terminals of said cord circuit, and

means for supplying talking current from said cord circuit when one of said connections is established.

4. A universal cord circuit for telephone systems comprising answering and calling connecting terminals, two sets of talking conductors normally uniting said terminals, inductive means connected in circuit of one set at a point between said terminals, a switching relay associated with each of said terminals and adapted to be operated when connection is made with a telephone line of one character but not operated when connection is made with a line of another character, circuit connections controlled by said relays whereby when two lines of one character are connected the set of inductively united talking conductors is effective, and when two lines of other but like character are connected the other set of conductively united talking conductors is effective, and means for supplying talking current for said cord circuit.

5. A universal cord circuit for telephone systems comprising answering and calling connecting terminals, two sets of talking conductors normally uniting said terminals, two sets of supervisory apparatus, electromagnetic switching mechanism associated with each of said terminals and adapted to be operated when connection is made with a telephone line of one character but not operated when connection is made with a line of another character, and circuit connections controlled by said switching mechanisms whereby when two lines of one character are connected one set of talking conductors and one set of supervisory apparatus are effective and when two lines of other but like character are connected the other set of talking conductors and supervisory apparatus are effective.

6. A universal cord circuit for interconnecting common battery and magneto telephone lines, comprising answering and calling connecting terminals, two sets of talking conductors normally uniting said terminals, electromagnetic switching mechanism associated with each of said terminals and adapted to be operated when connection is made with a common battery telephone line but not operated when connection is made with a magneto telephone line, common battery supervisory apparatus, magneto supervisory apparatus, and circuit connections controlled by said switching mechanism whereby when two common battery lines are connected one set of talking conductors and said common battery supervisory apparatus are effective, and when two magneto lines are connected the other set of talking conductors and magneto supervisory apparatus are effective.

7. A universal cord circuit for telephone systems comprising answering and calling

connecting terminals, sets of talking connections connecting said terminals, a supervisory signal associated with each terminal, supervisory relays normally disconnected from the conductors of said cord circuit for controlling said supervisory signals, a third supervisory signal having a controlling winding common to said terminals, means whereby when connection is made between lines of one character the first said supervisory signals are effective, and whereby when connection is made between lines of other but like character said third supervisory signal is effective.

8. A universal cord circuit for telephone systems comprising answering and calling connecting terminals, two sets of talking connections extending between and normally connected to said terminals, a supervisory signal associated with each terminal, a third supervisory signal having a controlling winding common to said terminals, means whereby when connection is made between lines of one character the first said supervisory signals are effective, and whereby when connection is made between lines of different character one of said first signals and said third signal are effective.

9. A universal cord circuit for telephone systems comprising answering and calling connecting terminals, a supervisory signal associated with each terminal, supervisory relays normally disconnected from the conductors of said cord circuit for controlling said supervisory signals, a third supervisory signal having a controlling winding common to said terminals, means whereby when connection is made between lines of one character the first said supervisory signals are effective, and whereby when connection is made between lines of other but like character said third supervisory signal is effective, means whereby when connection is made between lines of different character one of said first signals and said third signal are effective, and means for supplying talking current through the said supervisory relays.

10. A universal cord circuit for interconnecting common battery and magneto telephone lines comprising answering and calling connecting terminals, two sets of talking connections extending between and normally connected to said terminals, a common battery supervisory signal associated with each terminal, a magneto supervisory signal having a controlling winding common to said terminals, means whereby when connection is made between common battery lines said common battery signals are effective and one of said sets of talking connections is rendered ineffective, and whereby when connection is made between magneto lines said magneto signal is effective.

11. A universal cord circuit for intercon-

necting common battery and magneto telephone lines comprising answering and calling connecting terminals, two sets of talking connections normally connecting said terminals, a common battery supervisory signal associated with each terminal, supervisory relays normally disconnected from the conductors of said cord circuit for controlling said supervisory signals, a magneto supervisory signal having a controlling winding common to said terminals, and means whereby when connection is made between common battery lines said common battery signals are effective, and whereby when connection is made between a common battery and a magneto line one of said common battery signals and said magneto signal are effective.

12. A universal cord circuit for interconnecting common battery and magneto telephone lines comprising answering and calling connecting terminals, a common battery supervisory signal associated with each terminal, double wound supervisory relays normally disconnected from the strands of said cord circuit for controlling said supervisory signal, a magneto supervisory signal having a controlling winding common to said terminals, means whereby when connection is made between common battery lines said common battery signals are effective, and whereby when connection is made between magneto lines said magneto signal is effective, means whereby when connection is made between common battery and magneto lines a common battery signal and said magneto signal are effective, and means for supplying talking current through the said double wound supervisory relays when certain of said connections are established.

13. A telephone system comprising lines of one character and lines of another character, a universal cord circuit provided with an answering and a calling terminal for interconnecting said lines, two sets of talking connections extending between and normally connected to said terminals, means for automatically disconnecting one of said sets of talking connections when connection is established between lines of one of said characters, said talking connections being undisturbed when connection is established between lines of the other but like character.

14. A telephone system comprising local battery and common battery telephone lines, a universal cord circuit provided with an answering and a calling terminal for interconnecting said lines, talking connections extending between and normally connected to said terminals, means for connecting together two lines of the local battery type whereby said talking connections are undisturbed, and means for connecting together two lines of the common battery type where-

by one of said talking connections is interrupted and the second of said talking connections is rendered operative.

15. A telephone system comprising local battery and common battery telephone lines, a universal cord circuit provided with an answering and a calling terminal for interconnecting said lines, a normally connected inductive connection extending between said terminals, a normally connected conductive connection extending between said terminals, means for establishing a talking circuit between two lines of the local battery type whereby the talking connection includes the said conductive connection, and means for connecting together two lines of the common battery type whereby the conductive connection is interrupted and the inductive connection rendered effective.

16. A universal cord circuit for interconnecting common battery and local battery lines, an answering and a calling terminal for said cord circuit, a normal connection extending between said terminals and including the windings of the repeating coil, a second normal connection extending between the said terminals and short-circuiting the said first connection, means for removing the second of said connections when a connection is established between two of said common battery lines, and means for including the second of said paths in the talking connection when connection is established between lines of the local battery type.

17. A universal cord circuit for interconnecting common battery and local battery lines, an answering terminal and a calling terminal for said cord circuit, a supervisory relay including a pair of windings associated with the answering terminal of said cord circuit, a supervisory relay including a pair of windings associated with the calling terminals of said cord circuit, a cut-off drop associated with both the terminals of said cord circuit, means for establishing connection between two lines of the local battery type whereby the said cut-off drop is rendered effective, means for establishing connection between two lines of the common battery type whereby the said supervisory relays are rendered effective, and means for establishing connection between a common battery and a local battery line whereby the cut-off drop is rendered effective for use by the local battery line and the supervisory relay associated with the answering terminal of said cord circuit is rendered effective for use by the common battery line.

18. A universal cord circuit for interconnecting common battery and local battery lines, an answering terminal and a calling terminal for said cord circuit, a supervisory relay including a pair of windings associated with the answering terminal of said cord circuit, a supervisory relay including a

pair of windings associated with the calling terminal of said cord circuit, a cut-off drop associated with both the terminals of said cord circuit, means for establishing connection between two lines of the local battery type whereby the said cut-off drop is rendered effective, means for establishing connection between two lines of the common battery type whereby the said
10 supervisory relays associated with the calling and answering terminals of said cord circuit are rendered effective for supervisory purposes and for supplying talking current to the connected lines, and means for estab-

lishing connection between a common battery and a local battery line whereby the cut-off drop is rendered effective for use by the local battery line and the supervisory relay associated with the answering terminal of said cord circuit is rendered effective for use
20 by the common battery line.

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

RICHARD I. UTTER.

Witnesses:

GEORGE E. MUELLER,
M. R. ROCHFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."