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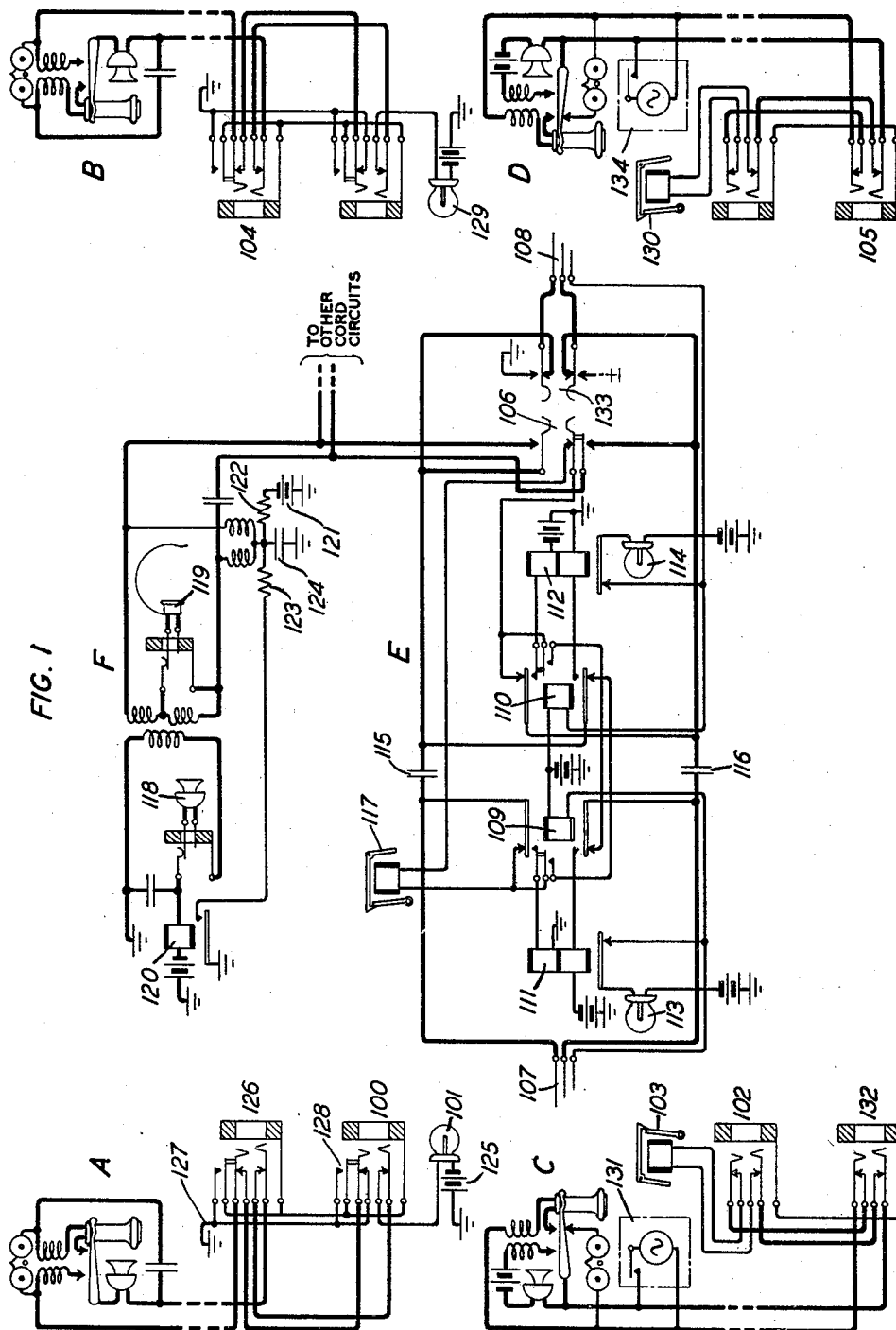
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1,904,017

TELEPHONE SYSTEM

Filed May 5, 1932

2 Sheets-Sheet 1



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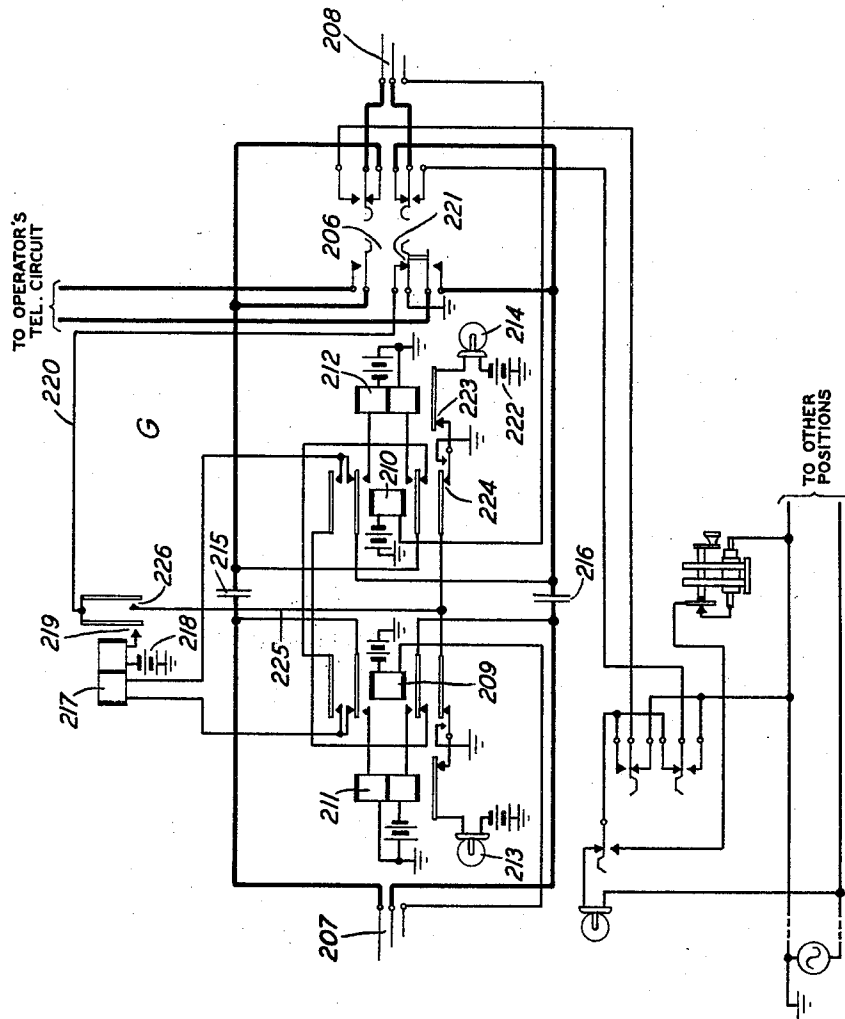
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FIG. 2



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TELEPHONE SYSTEM

Application filed May 5, 1932. Serial No. 609,412.

This invention relates to telephone systems and more particularly to universal cord circuits for interconnecting telephone lines of like or unlike character.

An object of the invention is to interconnect lines of like or of unlike character and to provide supervision for said connections.

A feature of the present invention, whereby the foregoing object is attained, resides in a universal cord circuit embodying circuit features hereinafter to be described.

The invention will be understood from the following description together with the accompanying drawings in which two embodiments of my invention are illustrated.

Fig. 1 shows a universal cord circuit for interconnecting magneto and common battery telephone lines, providing lamp supervision on connections to common battery lines only; and

Fig. 2 shows a modified form of this cord circuit providing lamp supervision on connections both to common battery lines and to magneto lines.

Circuit description

In Fig. 1 are shown two subscribers' common battery telephone stations A and B and two subscribers' magneto stations C and D connected by telephone lines with a central office wherein the lines are terminated at a switchboard in multiple jacks. A line lamp is associated with one of the jacks connected to each common battery line and a line drop is associated with one of the jacks connected to each magneto line.

The universal cord circuit E is one of several located at an operator's position at the switchboard, any of which may be connected to the operator's telephone circuit F by the operation of the individual cord circuit talk key, as for example key 106 in cord circuit E. We will assume that jack 100 and associated line lamp 101, jack 102 and associated line drop 103, jack 104 and jack 105 are located at the switchboard operator's position with which cord circuit E and telephone circuit F are associated and that the other jacks and line signals are located elsewhere in the switchboard.

Cord circuit E is provided with answering and calling plug terminals 107 and 108, respectively. Answering and calling sleeve relays 109 and 110 operate in response to connections to common battery lines and connect talking battery through the answering and calling supervisory relays 111 and 112, respectively, to the answering and the calling end of the cord talking conductors. Relays 111 and 112 control the answering and calling cord supervisory lamps 113 and 114, respectively.

Condensers 115 and 116 are inserted in the tip and ring cord talking conductors, respectively, in order to prevent the passage of direct current, but to allow variable talking current to be freely transmitted.

Cord drop 117 is designed to operate on alternating current from a subscriber's magneto generator and is normally bridged from the tip conductor of the answering cord to the ring conductor of the calling cord. Relay 109 in operating, with relay 110 unoperated, disconnects drop 117 from the tip of the answering cord and connects it between tip and ring conductors of the calling cord, while relay 110 in operating with relay 109 unoperated, transfers the connection of drop 117 to the tip and ring conductors of the answering cord. With relays 109 and 110 both operated, however, drop 117 is entirely disconnected from both ends of the cord.

The operator's telephone circuit F contains a transmitter 118 and receiver 119 and is provided with an arrangement for obtaining a "click" busy test upon both common battery and magneto lines which is covered by the copending application of R. W. Harper Serial No. 608,356, filed April 30, 1932 and to which I make no claim.

Fig. 2 shows a cord circuit G which may be substituted for cord circuit E in the arrangement previously described. In general it is similar to cord circuit E, but in this case double-wound relay 217 is provided instead of the cord drop. The left-hand winding of this relay is connected in the same manner as the winding of the drop in the previous circuit and the relay is designed to operate on alternating current from a subscriber's mag-

neto generator through this winding. The right-hand holding winding becomes energized when the relay pulls up and holds it operated under control of the cord talk key

5 206. Relay 217 controls the answering or calling cord supervisory lamp whenever the cord terminal associated with either lamp is connected to a magneto line.

Busy test

10 While applicant makes no claim to the busy test arrangement which is disclosed in Fig. 1, a brief description of this arrangement is necessary for a thorough understanding of the operation of the cord circuit.

15 With transmitter 118 connected in the telephone circuit as shown, a circuit is closed for the operation of relay 120 from battery, through the winding of relay 120, transmitter 20 118 and the primary of the induction coil to ground. Relay 120 in operating closes a potentiometer circuit from the central office battery 121 through resistances 122 and 123 and contacts of relay 120 to ground. Con- 25 denser 124 is connected from a point between the two resistances to ground and its upper plate is thereby maintained at a potential intermediate that of the ungrounded terminal of the central office battery and ground po- 30 tential.

If a cord is already plugged into one of the jacks of a called common battery line, ground is connected from the back contact of the occupied jack to the sleeves of all of the multi- 35 ple jacks associated with said line. The multiple jack sleeves of a busy magneto line, however, are connected only to central office battery on the sleeve conductor of the connected cord. The operator makes a busy test 40 by touching the tip of plug 108 to the sleeve of the called line keeping talk key 106 operated.

If common battery station B, for example, has been asked for, the operator touches the 45 tip of plug 108 to the sleeve of jack 104. If the line is busy due to the presence of another plug in the other multiple jack of said line ground on the sleeve of jack 104 will be connected to the tip conductor of the cord circuit E and telephone circuit F causing con- 50 denser 124 to partially discharge. Part of this discharge will pass through receiver 119 thus giving a click to the operator as a signal that the line is busy.

55 If magneto station D has been called and is already busy, battery from another cord is connected to the sleeves of the multiple jacks and will be connected to the tip of plug 108 when it is touched to jack 105. In this case 60 condenser 124 will take on a greater charge, part of the charging current passing through the operator's receiver, thus giving a click to the operator as a signal that this called line is busy.

65 Providing a called line of either type is idle,

however, neither battery nor ground is found connected to the sleeve of the jack and hence no click is received by the operator.

Operation

70 The operation of the circuit shown in Fig. 1 is as follows:

On a call from common battery station A, the subscriber removes the receiver from the switchhook thereby closing a circuit from 75 battery 125, through line lamp 101, contacts of jack 100, contacts of jack 126, through subscriber's set A, contacts of jack 126, contacts of jack 100 to ground 127, thereby causing line lamp 101 to light as a signal to the op- 80 erator. The operator inserts the plug 107 of the answering cord in jack 100 thereby opening the normally closed contacts of the jack and extinguishing line lamp 101, and connecting ground to the sleeve at the nor- 85 mally open contact 128. Relay 109 operates and cord supervisory lamp 113 lights on current from battery in the cord circuit to ground on the jack sleeve. The operation of relay 109 connects ground and battery to the 90 tip and ring of the cord through the windings of relay 111 operating this relay which extinguishes lamp 113. Relay 109 also disconnects the winding of drop 117 from the tip conductor of the answering cord and con- 95 nects it from the tip to the ring of the calling cord.

The operator answers the call with the talk key in the operated position. Now having a 100 talking connection with the party at station A, the operator ascertains the number of the line desired by him. Assuming that the call is for common battery station B, she thereupon performs a busy test in the manner al- 105 ready described and finding the line idle she inserts plug 108 in jack 104 thereby disconnecting line lamp 129 from the talking con- 110 ductors by opening the normally closed jack contacts and connecting ground to the jack sleeve at the normally open contact of the 115 jack. Relay 110 operates and lamp 114 lights from battery in the cord circuit to ground on the sleeve of jack 104. The operation of relay 110 connects ground and battery to the tip and ring of the calling cord and opens the circuit for drop 117, disconnecting it from the cord.

The operator releases talk key 106 and op- 120 erates ringing key 133 applying ringing current to the line and ringing the called subscriber. After a suitable ringing interval, she releases key 133. When the called sub- 125 scription answers, relay 112 operates extinguishing lamp 114. At the completion of the conversation, subscriber B hangs up causing relay 112 to release thereby lighting lamp 114. When the subscriber at station A hangs 130 up, relay 111 releases lighting lamp 113. The operator thereupon pulls down both cords whereupon the cord supervisory lamps 113 135

and 114 go out and the circuit is restored to normal.

Assuming now that the call from common battery station A is for magneto station D, the operator makes a busy test on jack 105 and finding the line idle, inserts plug 108 in jack 105 thereby disconnecting line drop 130 from the talking conductors. On this connection the relay 110 does not operate and lamp 114 does not light. Drop 117 remains in this case bridged across the tip and ring of the calling cord. The operator now presses ringing key 133 for a suitable interval ringing the called subscriber. The operator listens until the called subscriber answers whereupon she releases talk key 106.

When the subscriber at station D disconnects, he operates his hand generator 134 thereby applying alternating current to the line to operate drop 117 in the cord circuit.

When the subscriber at station A disconnects, relay 111 releases and cord supervisory lamp 113 lights as before. The operator after challenging on the line pulls down both cords and manually restores drop 117.

On a call from magneto station C, the subscriber operates his magneto generator 131 which sends alternating current over the line through contacts of jacks 132 and 102 and through the winding of line drop 103 causing it to operate, giving a signal to the operator. The operator inserts plug 107 of the answering cord into jack 102 and manually restores drop 103. The plug upon insertion opens the contacts of jack 102 thereby disconnecting the drop from the line. In this case relay 109 does not operate due to the permanently open condition of the sleeve circuit of the line. Under this condition drop 117 remains bridged from the tip conductor of the answering cord to the ring conductor of the calling cord.

The operator answers the call with the talk key in the operated position. Upon ascertaining that the call is for common battery station B, the operator performs a busy test and inserts plug 108 in jack 104 if the line is idle. Relay 110 operates and lamp 114 lights. The operation of relay 110 connects ground and battery to the tip and ring of the calling cord and connects drop 117 across the tip and ring of the answering cord. Ringing key 133 is operated as previously described. When the subscriber at station B answers relay 112 operates thereby extinguishing calling supervisory lamp 114.

At the completion of the conversation the subscriber at station B disconnects thereby releasing relay 112 and causing cord supervisory lamp 114 to light as a disconnect signal. When the subscriber at station C disconnects, he operates his magneto generator 131 thereby sending an alternating current over the line and operating cord drop 117 as a disconnect signal. After challenging on

the calling line, the operator pulls down calling and answering cords and manually restores drop 117.

If the call from station C, however, is intended for magneto station D, the operator performs the busy test in the usual manner and inserts plug 108 in jack 105 thereby disconnecting drop 130 from the line. Under this condition relays 109, 110, 111 and 112 remain unoperated and lamps 113 and 114 are not lighted. Thus drop 117 remains bridged from the tip conductor of the answering cord to the ring conductor of the calling cord. On disconnection, if either or both of the subscribers operate their magnetos, drop 117 will operate to give a disconnect signal to the operator. The operator after challenging on the lines will pull down both cords.

The operation of cord circuit G is substantially similar to that of cord circuit E. In this case, however, relay 217 is operated to give a disconnect signal for a magneto connection instead of cord drop 117. With the answering cord connected to a common battery line and the calling cord connected to a magneto line, relay 209 is operated and answering cord supervisory lamp 213 is under control of supervisory relay 211. Under this condition if relay 217 is operated, in response to a disconnect signal from the magneto generator in the called line, it is held operated on a current through its right-hand winding in a circuit from battery 218, through the right-hand winding and contact 219 of relay 217, through conductor 220, contact 221 of talk key 206 to ground. Calling supervisory lamp 214 is thereupon lighted on current from battery 222 through lamp 214, back contact 223 of relay 212, back contact 224 of relay 210, conductor 225, front contact 226 of relay 217, conductor 220, contact 221 of talk key 206 to ground. The operator thereupon operates talk key 206 and challenges on the line. The operation of talk key 206 opens at contact 221 the energizing circuit for relay 217 and lamp 214 causing the relay to release and extinguishing the lamp. The energizing circuits for lamp 214 and relay 217 are further opened at the contacts of relay 217. When the operator releases her talk key and pulls down the answering and calling cords, the circuits are restored to normal.

If, on the other hand, the answering cord is connected to a magneto line and the calling cord to a common battery line, lamp 213 is placed under control of relay 217 and lamp 214 under control of supervisory relay 212.

On a magneto to magneto line connection, however, both lamps are under control of relay 217 and are lighted simultaneously when it is operated in response to alternating current from the magneto generator at either subscriber's station.

While the present invention is disclosed as

embodied in certain specific arrangements, applicant does not wish to be limited by such disclosure, but desires to cover broadly all arrangements which come within the spirit and scope of the appended claims.

What is claimed is:

1. In a telephone system comprising lines of two different characters, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said terminals, inductive means included in each of said conductors, a supervisory signal for each end of the cord, an individual direct current responsive supervisory relay for controlling each signal normally disconnected from said conductors, an alternating current responsive signal controlling winding normally connected between the tip conductor of one end of the cord and the ring conductor of the other end, and means responsive to the connection of either terminal to a line of one character to connect its associated relay to that end of the cord circuit and to disconnect and transfer the alternating current responsive winding from that end to the opposite end and responsive to the connection of both terminals to lines of said one character to entirely disconnect said winding.
2. In a telephone system comprising lines of a first and a second character, impulse sending means associated with lines of the second character, a universal cord circuit for interconnecting any two of the lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said terminals, inductive means included in each of said conductors, a supervisory signal for each end of the cord, an individual supervisory relay for controlling each signal normally disconnected from said conductors, a signal controlling winding responsive to said impulse sending means normally connected between the tip conductor of one end of the cord and the ring conductor of the other end, and means responsive to the connection of either terminal to a line of the first character to connect its associated relay to that end of the cord circuit and to disconnect and transfer the impulse responsive winding from that end to the opposite end and responsive to the connection of both terminals to lines of the first character to entirely disconnect said winding.
3. In a telephone system, a link circuit for interconnecting two types of lines, two terminals for said link circuit, a set of talking conductors connecting said terminals, inductive means included in said conductors, a supervisory relay individual to each terminal adapted to be connected to the conductors between said inductive means and their respective terminals in response to the connection of their respective terminals to a first type of

line, supervisory signals controlled by said relays, a signal controlling winding normally connected to one talking conductor between its included inductive means and one terminal and to the other talking conductor between its included inductive means and the other terminal, and means responsive to the connection of a terminal to said first type of line to transfer the connection of said third signal entirely to the opposite end of the link and responsive to the connection of both terminals to lines of said first type to disconnect said third signal.

4. In a telephone system, lines of two different characters, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, a tip and a ring conductor connecting said terminals, a supervisory signal at each terminal, an individual supervisory relay for controlling each signal normally disconnected from said tip and ring conductors, a signal controlling winding normally connected between said tip and ring conductors, means responsive to the connection of one of said connecting terminals to a line of one character to connect the supervisory relay at said terminal between said tip and ring conductors, and means responsive to the connection of both of said terminals to a line of said character to connect both supervisory relays across the tip and ring conductors and to disconnect said signal controlling winding.

5. In a telephone system comprising two types of lines, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuits, tip and ring conductors connecting said terminals, inductive means included in each of said conductors, a supervisory signal for each end of said cord, an individual supervisory relay for controlling each signal normally disconnected from said tip and ring conductors, a signal controlling winding normally connected between the tip conductor of one end of the cord and the ring conductor of the other end, a switching relay for each end of the cord responsive to the connection of its respective terminal to one type of line to connect the supervisory relay at that end of the cord across its tip and ring conductors and to transfer the connection of said signal controlling winding to the opposite end, both of said switching relays cooperating to disconnect said signal controlling winding responsive to the connection of both terminals to said type of line.

6. In a telephone system comprising magneto and common battery telephone lines, magneto generators in said magneto lines, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said ter-

minals, inductive means included in each of said conductors, a supervisory signal for each end of the cord and individual direct current responsive supervisory relays for
 5 controlling each signal normally disconnected from said conductors, a winding responsive to current from said magneto generators normally connected between the tip conductor of one end of the cord and the ring
 10 conductor of the other end, and means responsive to the connection of either terminal to a common battery line to connect its associated relay to that end of the cord circuit and to disconnect and transfer the magneto current
 15 responsive winding from that end to the opposite end and responsive to the connection of both terminals to common battery lines to entirely disconnect said winding.

7. In a telephone system, magneto and
 20 common battery telephone lines, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuits, a tip conductor and a ring conductor connecting said
 25 terminals, a supervisory signal at each terminal, an individual supervisory relay for controlling each signal normally disconnected from said tip and ring conductors, a signal controlling winding responsive to magneto
 30 currents normally connected between said tip and ring conductors, means responsive to the connection of one of said connecting terminals to a common battery line to connect the supervisory relay at that terminal
 35 between said tip and ring conductors, and means responsive to the connection of both of said terminals to a common battery line to connect both supervisory relays across the tip and ring conductors and to disconnect
 40 said signal controlling winding.

8. In a telephone system comprising magneto and common battery lines, a universal
 cord circuit for interconnecting any two of
 45 said lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said terminal, inductive means included in each of said conductors, a supervisory signal for each end of said
 50 cord, an individual supervisory relay for controlling each signal normally disconnected from said tip and ring conductors, a signal controlling winding normally connected between the tip conductor of one end of the
 55 cord and the ring conductor of the other end, a switching relay for each end of the cord responsive to the connection of its respective terminal to a common battery line to connect the supervisory relay at that end of the cord
 60 across the tip and ring conductors and to transfer the connection of said signal controlling winding to the opposite end, both of said switching relays cooperating to disconnect said signal controlling winding responsive to the connection of both terminals to
 65 common battery lines.

9. In a telephone system comprising lines of two different characters, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, tip and ring
 70 conductors connecting said terminals, inductive means included in each of said conductors, a supervisory signal for each end of the cord, an individual supervisory relay for controlling each signal normally disconnected
 75 from said conductors, a third supervisory signal, a controlling winding therefor normally connected between the tip conductor of one end of the cord and the ring conductor of the other end, and means responsive to the
 80 connection of either terminal to a line of one character to connect its associated relay to that end of the cord circuit and to disconnect and transfer the third signal winding from that end to the opposite end and responsive
 85 to the connection of both terminals to lines of said one character to entirely disconnect said third signal winding.

10. In a telephone system, a link circuit for interconnecting two types of lines, two
 90 terminals for said link circuit, a set of talking conductors connecting said terminals, inductive means included in said conductors, a supervisory relay individual to each terminal adapted to be connected to the conductors
 95 between said inductive means and their respective terminals in response to the connection of their respective terminals to a first type of line, supervisory signals controlled by said relays, a third supervisory signal and
 100 a controlling winding therefor normally connected to one talking conductor between its included inductive means and one terminal and to the other talking conductor between its included inductive means and the other terminal
 105 and means responsive to the connection of a terminal to said first type of line to transfer the connection of said third signal entirely to the opposite end of the link and responsive to the connection of both terminals to lines of said first type to disconnect
 110 said third signal.

11. In a telephone system, lines of two different characters, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, a tip conductor and a ring
 115 conductor connecting said terminals, a supervisory signal at each terminal, an individual supervisory relay for controlling each signal normally disconnected from said tip and ring conductors, a third supervisory signal, a controlling winding therefor normally connected between said tip and ring conductors, means responsive to the connection of one of
 120 said connecting terminals to a line of one character to connect the supervisory relay at that terminal between said tip and ring conductors, and means responsive to the connection of both of said terminals to a line of said
 125
 130

character to connect both supervisory relays across the tip and ring conductors and to disconnect said third signal controlling winding.

12. In a telephone system comprising two types of lines, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said terminals, inductive means included in each of said conductors, a supervisory signal for each end of said cord, an individual supervisory relay for controlling each signal normally disconnected from said tip and ring conductors, a third supervisory signal, a controlling winding therefor normally connected between the tip conductor of one end of the cord and the ring conductor of the other end, a switching relay for each end of the cord responsive to the connection of its respective terminal to one type of line to connect the supervisory relay at that end of the cord across its tip and ring conductors and to transfer the connection of said third signal-controlling winding to the opposite end, both of said switching relays cooperating to disconnect said third signal controlling winding responsive to the connection of both terminals to said type of line.

13. In a telephone system comprising magneto and common battery telephone lines, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said terminals, inductive means included in each of said conductors, supervisory signals for each end of the cord, an individual common battery supervisory relay for controlling each signal normally disconnected from said conductors, a magneto supervisory signal, a controlling winding therefor normally connected between the tip conductor of one end of the cord and the ring conductor of the other end, and means responsive to the connection of either terminal to a common battery line to connect its associated relay to that end of the cord circuit and to disconnect and transfer the magneto signal winding from said end to the opposite end and responsive to the connection of both terminals to common battery lines to entirely disconnect said magneto signal winding.

14. In a telephone system, a link circuit for interconnecting magneto and common battery lines, two terminals for said link circuit, a set of talking conductors connecting said terminals, inductive means included in said conductor, a common battery supervisory relay individual to each terminal adapted to be connected to the conductor between said inductive means and their respective terminals in response to the connection of their respective terminals to a common battery line, common battery supervisory sig-

nals controlled by said relays, a magneto supervisory signal and a controlling winding therefor normally connected to one talking conductor between its included inductive means and one terminal and to the other talking conductor between its included inductive means and the other terminal, and means responsive to the connection of a terminal to a common battery line to transfer the connection of said magneto signal entirely through the opposite end of the link and responsive to the connections of both terminals to common battery lines to disconnect said magneto signal.

15. In a telephone system comprising lines of two different characters, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said terminals, inductive means included in each of said conductors, a supervisory signal for each end of the cord, an individual supervisory relay for controlling each signal normally disconnected from said conductors, a third supervisory relay for controlling said supervisory signal normally connected between the tip conductor of one end of the cord and the ring conductor of the other end, and means responsive to the connection of either terminal to a line of one character to connect its associated relay to that end of the cord circuit and to disconnect and transfer the third relay from that end to the opposite end and responsive to the connection of both terminals to lines of said one character, to entirely disconnect said third supervisory relay.

16. In a telephone system, a link circuit for interconnecting lines of two types, two terminals for said link circuit, a set of talking conductors connecting said terminals, inductive means included in said conductors, a supervisory relay individual to each terminal adapted to be connected to the conductors between said inductive means and its respective terminal in response to the connection of its respective terminals to a first type of line, a third supervisory relay normally connected to one talking conductor between its included inductive means and one terminal and to the other talking conductor between its included inductive means and the other terminal, two supervisory signals controlled by said relays, and means responsive to the connection of a terminal to said first type of line to transfer the connection of said third signal controlling relay entirely to the opposite end of the link and responsive to the connection of both terminals to lines of said first type to disconnect said third relay.

17. In a telephone system, lines of two different characters, a universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, a tip conductor and a ring con-

- ductor connecting said terminals, a supervisory signal at each terminal, an individual supervisory relay for controlling each signal normally disconnected from said tip and ring
- 5 conductors, a third supervisory relay for controlling said signals normally connected between said tip and ring conductors, means responsive to the connection of one of said connecting terminals to a line of one character to connect the individual supervisory
- 10 relay at that terminal between said tip and ring conductors, and means responsive to the connection of both of said terminals to lines of said character to connect both individual supervisory relays across the tip and
- 15 ring conductors and to disconnect said third supervisory relay.
18. In a telephone system comprising two types of lines, a universal cord circuit for
- 20 interconnecting any two of said lines, answering and calling connecting terminals of said cord circuit, tip and ring conductors connecting said terminals, inductive means included in each of said conductors, a supervisory signal for each end of said cord, an
- 25 individual supervisory relay for controlling each signal normally disconnected from said tip and ring conductors, a third supervisory relay for controlling said signals normally connected between the tip conductor of one
- 30 end of the cord and the ring conductor of the other end, a switching relay for each end of the cord responsive to the connection of its respective terminal to one type of line to connect the individual supervisory relay at
- 35 that end of the cord across its tip and ring conductors and to transfer the connection of said third supervisory relay to the opposite end, both of said switching relays cooperating to disconnect said third supervisory
- 40 relay responsive to the connection of both terminals to said type of line.
19. In a telephone system comprising magneto and common battery telephone lines, a
- 45 universal cord circuit for interconnecting any two of said lines, answering and calling connecting terminals for said cord circuit, tip and ring conductors connecting said terminals, inductive means included in each of said
- 50 conductors, a supervisory signal for each end of the cord, an individual supervisory relay for controlling each signal normally disconnected from said conductors, a third supervisory relay normally connected between the tip
- 55 conductor of one end of the cord and the ring conductor of the other end, and means responsive to the connection of either terminal to a common battery line to connect its associated individual relay to that end of the
- 60 cord circuit and to disconnect and transfer the third relay from that end to the opposite end and responsive to the connection of both terminals to a common battery line to entirely disconnect said third relay.
- 65 20. In a telephone system, a link circuit for interconnecting magneto and common battery lines, two terminals for said link circuit, a set of talking conductors connecting said terminals, inductive means included in said conductors, a supervisory relay individual to each terminal adapted to be connected to the
- 70 conductors between said inductive means and their respective terminals in response to the connection of their respective terminals to a common battery line, a third supervisory relay normally connected to one talking conductor between its included inductive means and one terminal, and to the other talking
- 75 conductor between its included inductive means and the other terminal, supervisory signals controlled by said relays, and means responsive to the connection of a terminal to a common battery line to transfer the connection of the third supervisory relay entirely
- 80 to the opposite end of the link and responsive to the connection of both terminals to a common battery line to disconnect said third supervisory relay.
- In witness whereof, I hereunto subscribe my name this 4th day of May, 1932.
- 85
- HORACE W. ULRICH.
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