

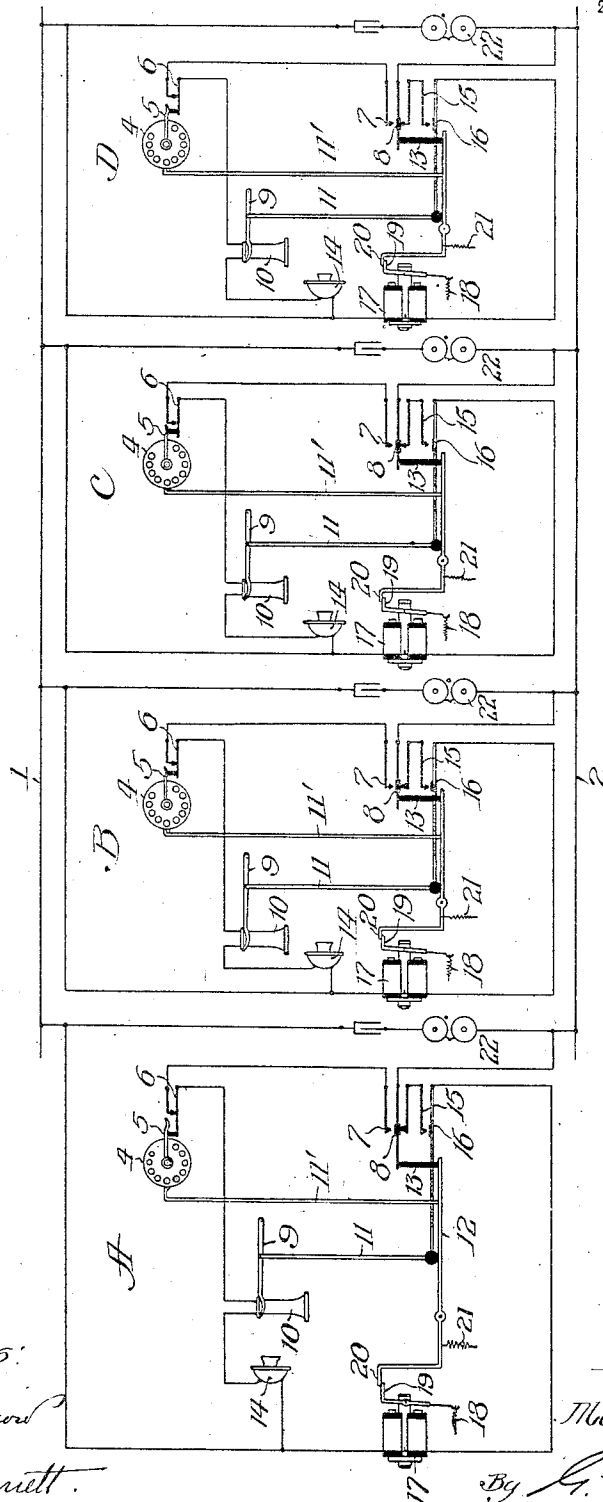
M. L. JOHNSON.
TELEPHONY.
APPLICATION FILED MAY 22, 1911.

1,056,423.

Patented Mar. 18, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Geo. C. Brown
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Inventor:
Morton L. Johnson.

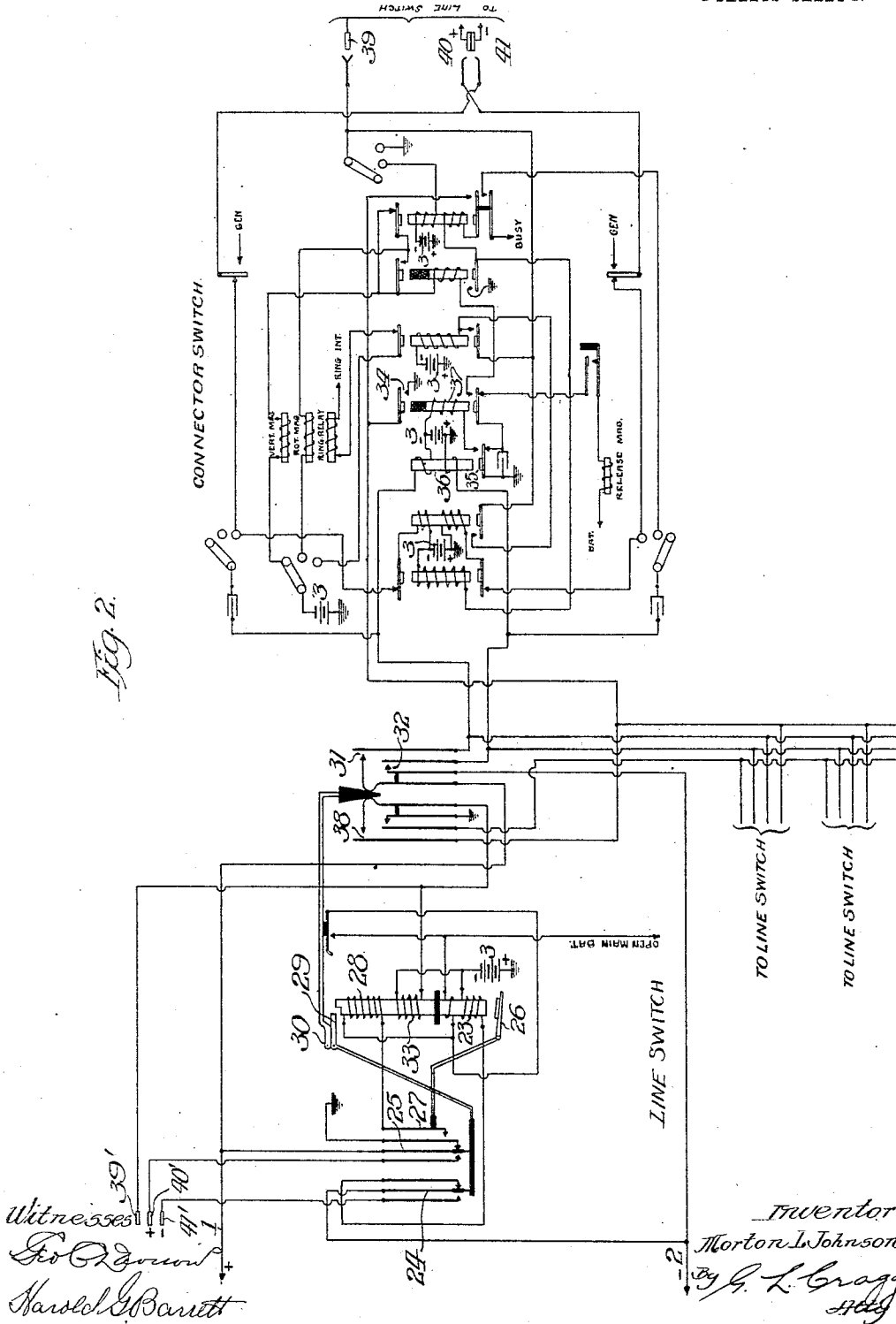
By *L. K. Cragg*
Att'y

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TELEPHONY.
APPLICATION FILED MAY 22, 1911.

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Patented Mar. 18, 1913.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

MORTON L. JOHNSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO CORWIN TELEPHONE MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TELEPHONY.

1,056,423.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed May 22, 1911. Serial No. 628,777.

To all whom it may concern:

Be it known that I, MORTON L. JOHNSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephony, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone exchange systems employing party telephone lines and includes features which may be of service in connection with manual, automatic and semi-automatic exchange systems. I employ electro-magnets at the party telephone line stations for preventing and permitting the operation of selecting mechanism at the exchange, where the exchange employs mechanism for automatically extending lines, and for governing the switches that control the circuit association of the telephone receivers with the line, there being a source of current normally connected with the line to the current from which the electro-magnets are normally responsive to enable the party at a station first seeking the use of the line effectively to manipulate his apparatus for that purpose. There is present mechanism for changing the circuit association of the source of current with the line when the line has been taken for use so that parties at other stations upon the line who later seek the use of the line cannot include their telephone receivers in circuit association with the line nor cause nor interfere with the operation of the selecting mechanism at the exchange.

The electro-magnets are desirably included in high resistance bridge conductors while there are low resistance bridge conductors at the different stations to enable a party line subscriber who takes the line for use to establish a shunt to deprive the magnets at other stations of operating current so that parties at such other stations later seeking to take the line cannot interfere with its use.

I will explain my invention more fully by reference to the accompanying drawings showing an embodiment thereof in the form of an automatic telephone exchange system, to which the invention is not to be limited, and in which drawings—

Figure 1 shows a party telephone line with

four stations connected therewith, and Fig. 2 shows the exchange end of said party telephone line and automatically operated selecting mechanism for effecting extension of the party telephone line.

The telephone line extends from the exchange in two limbs 1, 2 and, in the embodiment of the invention illustrated, is normally connected at its two sides with the poles of a battery 3, the side 1 being grounded and connected through the ground to the positive pole of the battery 3, and the negative pole of the battery 3 being connected with the side 2 of the line. The current furnished by the battery 3 is preferably uni-directional, particularly where the invention is embodied in an automatic or semi-automatic telephone exchange system, the source of uni-directional current being normally connected with the line to permit current to have initial flow over the line in a single direction. Mechanism is provided at the exchange for reversing the current applied to the line after a party at one of the telephone stations upon the line takes the line for use, the source of current 3 being itself then reversed so that the side 1 is charged from the negative pole of the battery and the side 2 is charged from the positive pole of the battery. This is the case where the source of current 3 furnishes uni-directional current, but I do not wish to be limited to the employment of the same source of current for connection with the line normally and after the line has been taken for use. The apparatus by which the battery 3 is reversed, and which is illustrated in Fig. 2, is familiar to those that are skilled in the art of automatic telephony and will be later more fully referred to.

I have shown four party line stations A B C D though I do not limit myself to the number of stations that are connected with the party line. As the invention is illustrated, the equipments at the four stations are identical except, if desired, the signal receivers at the different stations may be of harmonic type to respond to wave form current of different periodicities to be selectively impressed upon the line at the exchange. The signal receivers may be alike, if desired, in which event code signals should be employed.

Similar parts at the different stations will be given similar characters of reference, one

station being specifically described. In the system illustrated, being an automatic telephone exchange system, I have illustrated a well known type of switching mechanism at each telephone station for operating the selecting mechanism at the exchange. In the embodiment of the invention illustrated, the switching mechanism is controlled by a well known dial mechanism that includes a spring winding finger ring or dial 4. The lever 5, engaged by the finger at the limit of the dial stroke, releases a spring actuated device that intermittently operates the circuit opening switch 6 during the return of the spring actuated mechanism to normal. It is not necessary to describe in further detail the switching mechanism that is employed to operate the selecting mechanism at the exchange and furthermore, the invention is not to be limited to the particular type of switching mechanism illustrated, nor is the invention in all of its embodiments to be limited to a telephone system employing selecting mechanism for effecting extension of the telephone line. It should be said, however, that when the invention is embodied in a system employing selecting mechanism for automatically effecting the extension of telephone lines that it is usual, where dial mechanism is used, to employ a master switch including contacts 7 and 8, in conjunction with the switching device 6 and in serial relation therewith, this master switch being controlled by the switch hook 9. The telephone receiver 10, when upon its switch-hook, operates to depress the element 8 of the master switch, and there open the circuit through switch 6, through the intermediation of the depressing finger 11 and the right hand end portion of the lever 12 then depressed by the finger 11, the right hand end portion of the lever 12 being mechanically connected with the switching element 8 by means of a strut 13. The switch hook when depressed causes pawl 11' to hold the dial. There is a low resistance bridge conductor at each telephone station that includes the telephone transmitter 14 having one terminal telephonically connected with the limb 1 of the telephone line, and the receiver 10 in serial relation with the transmitter 14, the dial switch 6, and the contacts 7 and 8.

The normally open connection which has just been traced between the sides of the telephone line is in parallel relation with another bridge conductor which is desirably of high resistance and is preferably normally open, at the contacts 15, 16. This second bridge conductor includes a magnet 17 which is preferably polarized, and the entire resistance of this second bridge conductor is preferably located in the magnet which may be wound, for example, to ten thousand ohms resistance. The armature

of the polarized magnet 17 is preferably held in a predetermined normal position by means of a spring 18 that normally locks the nose or angular extension 19 of the armature beneath the nose or angular extension 20 of the intermediately pivoted lever 12. A spring 21 normally presses the nose 20 against the nose 19. The contact element 16 is mechanically connected with the finger 11 so that said contact 16 is permitted to engage the contact 15 when the associated telephone receiver 10 at a calling station is removed from its hook, whereby the high resistance bridge conductor including the magnet 17 is closed whereupon current from the battery 3 is permitted initial flow over the line sides in a direction that will enable the magnet 17 to respond and draw its armature 19 from engagement with the nose 20 of the lever 12 against the force of the spring 18 whereupon the spring 21 is permitted to swing the lever 12 in a counter clock wise direction, the finger 11 having previously been raised owing to the removal of the telephone from its switch-hook. The contacts 7 and 8 of the master switch are thereupon engaged, whereafter the low resistance bridge conductor is intermittently broken at 6 in a manner which is well understood and for the purpose of operating the selecting mechanism at the exchange to extend the telephone line in a manner well known. The low resistance shunts at the stations permit of sufficient flow of current through the selecting mechanism at the exchange to enable such selecting mechanism to operate. The high resistance shunts that include the magnets 17 do not permit of the diversion of sufficient current from the low resistance shunts to interfere with the control that the switching mechanism in such a low resistance shunt at a station which has appropriated the line has over the selecting mechanism at the exchange. It is of course understood that the electro-magnet 17 is responsive only to the current that is initially impressed upon the line owing to the normal connection of the battery 3 with said line this magnet at other times maintaining the telephone bridge open.

By mechanism which is well understood, and which will later be mentioned more fully, the battery 3 has its connections with the sides of the telephone line reversed so that the current impressed upon the line immediately after the line is taken for use is such that the magnets 17 will not respond thereto, whereby those stations upon the line that are late in seeking to take the line for use cannot appropriate the line owing to the fact that the lever 12 at any station later to seek appropriation of the line is locked by the armature of the magnet at such station, whereby the contacts 7 and 8 of the master switch cannot be engaged to close the gap

in the low resistance bridge at this later station, which closure is essential to enable a station to take a line for use, pawl 11¹ then locking the dial. While current at any station at any time may be permitted to flow through the magnet 17 at such station, yet such magnet will not respond if the battery 3 has been reversed since the magnet will then be so energized as merely to tend to move its armature in the same direction in which such armature is pulled by the spring 18 without effecting readjustment of the parts that enter into the control of the receiver circuit and the control of the switching mechanism that governs the operation of the selecting mechanism whereby the associate telephone receiver is locked out. I therefore speak of the magnet 17 as being unresponsive to current that is caused to flow over the telephone line in a direction opposite to the normal flow of the current.

The signal receiver 22 responds to wave form current that is preferably an alternating current and is operated in a manner which is well understood.

I have described the operation of the equipment at a single telephone station in detail under the assumption that such a station is a calling station, and under such assumption the battery 3 is immediately reversed after the line has been taken for use. When any of the stations upon the line is a called station, the battery 3 should have its normal connection with the telephone line preserved, at least until the called station has responded, in order that the magnet 17 at the called station may respond to permit the closure of the contacts 7 and 8 thereat and thereby enable the inclusion of the telephone equipment at the called station in bridge of the telephone line. The low resistance bridge established at the called station by the removal of the telephone receiver from its switch hook serves to prevent the passage of sufficient current to operate magnets 17 at the remaining stations, irrespective of the direction of such current, so that none of the remaining stations connected with a called line is able to secure connection with such line when a called station has previously responded. I do not limit myself to the function of the low resistance shunt in excluding the magnets 17 from operative association with the current impressed upon the line at the exchange.

I will now describe, in a general way, the means by which the battery 3 is reversed after the line has been taken for use by a calling party and whereby said battery is maintained in normal connection with a called line, at least until the called party responds. Referring now more particularly to Fig. 2, the battery 3 has its negative pole normally connected with the side 2 of the

ing 23, the switch spring 24 and the normal contact of such spring. The positive pole of the battery 3 is connected with the side 1 of the telephone line through ground and the switch spring 25 and its normal contact. When the telephone line is taken for use by a calling party at one of the stations, circuit for the battery 3 is closed at the contacts 15, 16 at that telephone station, whereupon magnet 17 at such station is operated with results which have been described. Later, the contacts 7 and 8 at the line appropriating station are engaged to close the low resistance shunt at such appropriating station, whereupon current from the battery 3 is increased sufficiently to energize the winding 23 (this winding not having been previously operatively energized owing to the presence of the high resistance magnet 17 in circuit therewith) to cause the armature 26 to be attracted. The armature 26, in being attracted, pushes the contact 27 into engagement with the normal contact of the switch spring 25, thereby to bring the energizing winding 28 into a closed local circuit that may be traced from the grounded normal contact of the switch spring 25 through the winding 28 to the grounded battery 3 by the path marked "Open main bat." when the master switch mechanism is at rest, whereby the armatures 29 and 30 are attracted with the result that the battery 3 has its connections with the sides of the telephone line reversed, these connections being then traceable from the side 1 of the telephone line, the contacts 31 that are closed by the armature 30 to the negative side of the battery 3 illustrated at the right of Fig. 2 (the illustration of the battery 3 being repeated five times for sake of clearness) thence to the positive pole of the battery which is connected with the side 2 of the telephone line through the contacts 32 closed by the armature 30. The battery 3 is thus reversed instantly upon the closure of the contacts 7 and 8 at a calling station with the results which have been described. This association of the battery and telephone line is preserved during the time the receiver at the calling station is free of its hook owing to the establishment of a locking circuit through the locking winding 33. This locking circuit may be traced from the contacts 34 (closed as a consequence of the operation of the armature 35 of the magnet 36 included in the circuit of the battery 3 last traced, the subsequent energization of the magnet 37 controlling the contacts 34) through the contacts 38 closed by the armature 30, locking winding 33, the battery 3 and the ground that connects the battery with the contacts 34.

When the line 1, 2 is a called line, the battery 3 is not to have its connection with such called line reversed from normal at

least until after the called party has responded for the reasons which have been mentioned. This characteristic of my invention is of service in connection with
 5 called lines whether such called lines be automatically connected with calling lines or not. In automatic practice a called line has waiting contacts 39, 40 and 41, the circuit relation of these contacts being similar to
 10 the circuit relation of the waiting contacts 39¹, 40¹ and 41¹ associated with the line 1, 2. The normal connection of the battery 3 with the called line is preserved for the purpose stated owing to the inaction of the armature
 15 30 due to the fact that the winding 28 is not energized, and the winding 33 is energized, this latter winding having operating influence upon the armature 29 alone. When the armature 29 is attracted, the springs 24 and
 20 25 engage their alternate contacts whereby waiting contacts 40 and 41 of a called line are connected with the line sides 1 and 2.

The equipment illustrated in Fig. 2 will not be further described since all of the parts
 25 and the circuit relations of such parts as illustrated are now well known to those skilled in the art of automatic telephony, British Patent No. 1298 of 1910 serves to illustrate the prior art respecting a well
 30 known type of automatic telephone system.

While I have herein shown and particularly described my invention as being embodied in an automatic telephone exchange system in which not only trunk lines or link
 35 connectors at an exchange are automatically constituted extensions of telephone lines, but in which called telephone lines are also automatically constituted extensions of called telephone lines, I do not wish to be limited
 40 to the embodiment of my invention in an automatic exchange or in an exchange in which telephone lines are automatically constituted extensions of calling telephone lines nor do I wish to be limited, in all embodiments of my invention, to the employment
 45 of selecting mechanism for automatically extending telephone lines. Neither do I wish to be limited to the precise circuit arrangements that I have illustrated for accomplishing the object of my invention, as
 50 changes may readily be made without departing from the spirit of the invention.

Having thus described my invention, I claim as new and desire to secure by Letters
 55 Patent the following:—

1. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; a source of uni-
 60 directional current normally connected with the line to permit current to have initial flow thereover in a single direction; switching devices at the telephone stations for governing the association of telephones thereat
 65 with said line; polarized electro-magnets for

preventing and permitting the operation of said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the circuit relation of the polarized magnets, the line, and
 70 said source of current, and in turn governed by the receivers at said stations; and means at the exchange responsive to the current initially flowing over the line and in turn
 75 operating to reverse the polarity of the current supplied to the line to make the polarized magnets at the telephone stations unresponsive to current flowing over the line, whereby the station first taking the line for
 80 use may have the use of the line to the exclusion of the other stations.

2. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; a source of unidirectional current normally connected with
 85 the line to permit current to have initial flow thereover in a single direction; switching devices at the telephone stations for governing the association of telephones thereat with said line; polarized electro-magnets for preventing and permitting the operation of
 90 said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the circuit relation of the polarized magnets, the line, and said
 95 source of current; and means at the exchange responsive to the current initially flowing over the line and in turn operating to reverse the polarity of the current supplied to the line to make the polarized magnets at the telephone stations unresponsive
 100 to current flowing over the line, whereby the station first taking the line for use may have the use of the line to the exclusion of the other stations.
 105

3. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; a source of current normally connected with the line; switching
 110 devices at the telephone stations for governing the association of telephones thereat with said line; electro-magnets for preventing and permitting the operation of said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone
 115 stations for governing the connections of the magnets with the line and in turn governed by the receivers at said stations; and means at the exchange responsive to the current initially flowing over the line and in
 120 turn operating to limit the line to current to which the magnets are not responsive; whereby the station first taking the line for use may have the use of the line to the exclusion of the other stations.
 125
 130

4. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; a source
 5 of current normally connected with the line; switching devices at the telephone stations for governing the association of telephones thereat with said line; electro-magnets for preventing and permitting the operation of
 10 said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the connections of the magnets with the line; and means at
 15 the exchange responsive to the current initially flowing over the line and in turn operating to limit the line to current to which the magnets are not responsive, whereby the station first taking the line for use may
 20 have the use of the line to the exclusion of the other stations.

5. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with tele-
 25 phone receivers and transmitters; a source of uni-directional current normally connected with the line to permit current to have initial flow thereover in a single direction; switching devices at the telephone
 30 stations for governing the association of telephones thereat with said line; polarized electro-magnets for preventing and permitting the operation of said switching devices and responsive to the current normally im-
 35 pressed upon the line; and means at the exchange responsive to the current initially flowing over the line and in turn operating to reverse the polarity of the current supplied to the line to make the polarized mag-
 40 nets at the telephone stations unresponsive to current flowing over the line, whereby the station first taking the line for use may have the use of the line to the exclusion of the other stations.

45 6. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; a source of current normally connected with the line;
 50 switching devices at the telephone stations for governing the association of telephones thereat with said line; electro-magnets for preventing and permitting the operation of said switching devices and responsive to the
 55 current normally impressed upon the line; and means at the exchange responsive to the current initially flowing over the line and in turn operating to limit the line to current to which the magnets are not responsive,
 60 whereby the station first taking the line for use may have the use of the line to the exclusion of the other stations.

7. A telephone exchange system including a line connecting an exchange with a plu-
 65 rality of stations equipped with telephone

receivers and transmitters; selecting mechanism at the exchange for extending the line thereat; switching mechanism at the tele-
 phone stations for causing the operation of the selecting mechanism; a source of uni-
 70 directional current normally connected with the line to permit current to have initial flow thereover in a single direction; switching devices at the telephone stations for governing the association of the aforesaid
 75 switching mechanism with said line; polarized electro-magnets for preventing and permitting the operation of said switching devices and responsive to the current normally impressed upon the line; additional switch-
 80 ing devices at the telephone stations for governing the circuit relation of the polarized magnets, the line, and said source of current, and in turn governed by the receivers at said stations; and means at the ex-
 85 change responsive to the current initially flowing over the line and in turn operating to reverse the polarity of the current supplied to the line to make the polarized magnets at the telephone stations unresponsive
 90 to current flowing over the line, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

8. A telephone exchange system includ-
 95 ing a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending the line thereat; switching mechanism at
 100 the telephone stations for causing the operation of the selecting mechanism; a source of uni-directional current normally connected with the line to permit current to have initial flow thereover in a single di-
 105 rection; switching devices at the telephone stations for governing the association of the aforesaid switching mechanism with said line; polarized electro-magnets for preventing and permitting the operation of said
 110 switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the circuit relation of the polarized magnets, the line, and said
 115 source of current; and means at the exchange responsive to the current initially flowing over the line and in turn operating to reverse the polarity of the current supplied to the line to make the polarized mag-
 120 nets at the telephone stations unresponsive to current flowing over the line, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.
 125

9. A telephone exchange system including a line connecting an exchange with a plu-
 rality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending the line
 130

thereat; switching mechanism at the telephone stations for causing the operation of the selecting mechanism; a source of current normally connected with the line; switching devices at the telephone stations for governing the association of the aforesaid switching mechanism with said line; electro-magnets for preventing and permitting the operation of said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the connections of the magnets with the line and in turn governed by the receivers at said stations; and means at the exchange responsive to the current initially flowing over the line and in turn operating to limit the line to current to which the magnets are not responsive, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

10. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending the line thereat; switching mechanism at the telephone stations for causing the operation of the selecting mechanism; a source of current normally connected with the line; switching devices at the telephone stations for governing the association of the aforesaid switching mechanism with said line; electro-magnets for preventing and permitting the operation of said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the connections of the magnets with the line; and means at the exchange responsive to the current initially flowing over the line and in turn operating to limit the line to current to which the magnets are not responsive, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

11. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending the line thereat; switching mechanism at the telephone stations for causing the operation of the selecting mechanism; a source of uni-directional current normally connected with the line to permit current to have initial flow thereover in a single direction; switching devices at the telephone stations for governing the association of the aforesaid switching mechanism with said line; polarized electro-magnets for preventing and permitting the operation of said switching devices and responsive to the cur-

rent normally impressed upon the line; and means at the exchange responsive to the current initially flowing over the line and in turn operating to reverse the polarity of the current supplied to the line to make the polarized magnets at the telephone stations unresponsive to current flowing over the line, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

12. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending the line thereat; switching mechanism at the telephone stations for causing the operation of the selecting mechanism; a source of current normally connected with the line; switching devices at the telephone stations for governing the association of the aforesaid switching mechanism with said line; electro-magnets for preventing and permitting the operation of said switching devices and responsive to the current normally impressed upon the line; and means at the exchange responsive to the current initially flowing over the line and in turn operating to limit the line to current to which the magnets are not responsive, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

13. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending the line thereat; switching devices at the telephone stations for causing the operation of the selecting mechanism; a source of uni-directional current normally connected with the line to permit current to have initial flow thereover in a single direction; polarized electro-magnets for normally preventing and serving to permit the operation of said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the circuit relation of the polarized magnets, the line, and said source of current, and in turn governed by the receivers at said stations; and means at the exchange responsive to the current initially flowing over the line and in turn operating to reverse the polarity of the current supplied to the line to make the polarized magnets at the telephone stations unresponsive to current flowing over the line, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

14. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with tele-

phone receivers and transmitters; selecting mechanism at the exchange for extending the line thereat; switching devices at the telephone stations for causing the operation
 5 of the selecting mechanism; a source of unidirectional current normally connected with the line to permit current to have initial flow thereover in a single direction; polarized electro-magnets for normally preventing
 10 and serving to permit the operation of said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the circuit relation
 15 of the polarized magnets, the line, and said source of current; and means at the exchange responsive to the current initially flowing over the line and in turn operating to reverse the polarity of the current supplied to the
 20 line to make the polarized magnet at the telephone stations unresponsive to current flowing over the line, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

25 15. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending
 30 the line thereat; switching devices at the telephone stations for causing the operation of the selecting mechanism; a source of current normally connected with the line; electro-magnets for normally preventing and
 35 serving to permit the operation of said switching devices and responsive to the current normally impressed upon the line; additional switching devices at the telephone stations for governing the connections of
 40 the magnets with the line and in turn governed by the receivers at said stations; and means at the exchange responsive to the current initially flowing over the line and in turn operating to limit the line to current to
 45 which the magnets are not responsive, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

50 16. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending
 55 the line thereat; switching devices at the telephone stations for causing the operation of the selecting mechanism; a source of current normally connected with the line; electro-magnets for normally preventing and serving to permit the operation of said
 60 switching devices and responsive to the current normally impressed upon the line; ad-

ditional switching devices at the telephone stations for governing the connections of the magnets with the line; and means at the exchange responsive to the current initially
 65 flowing over the line and in turn operating to limit the line to current to which the magnets are not responsive, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

70 17. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending
 75 the line thereat; switching devices at the telephone stations for causing the operation of the selecting mechanism; a source of unidirectional current normally connected with the line to permit current to have initial flow thereover in a single direction; polarized electro-magnets for normally preventing
 80 and serving to permit the operation of said switching devices and responsive to the current normally impressed upon the line; and means at the exchange responsive to the current initially flowing over the line and in turn operating to reverse the polarity of
 85 the current supplied to the line to make the polarized magnets at the telephone stations unresponsive to current flowing over the line, whereby the station first taking the line for use may have exclusive control over
 90 said selecting mechanism.

95 18. A telephone exchange system including a line connecting an exchange with a plurality of stations equipped with telephone receivers and transmitters; selecting mechanism at the exchange for extending
 100 the line thereat; switching devices at the telephone stations for causing the operation of the selecting mechanism; a source of current normally connected with the line; electro-magnets for normally preventing and
 105 serving to permit the operation of said switching devices and responsive to the current normally impressed upon the line; and means at the exchange responsive to the current initially flowing over the line and in turn operating to limit the line to current to
 110 which the magnets are not responsive, whereby the station first taking the line for use may have exclusive control over said selecting mechanism.

11 In witness whereof, I hereunto subscribe my name this fourth day of May A. D., 1911.

MORTON L. JOHNSON.

Witnesses:

MARGARET D. ROBB,
 G. L. CROGG.