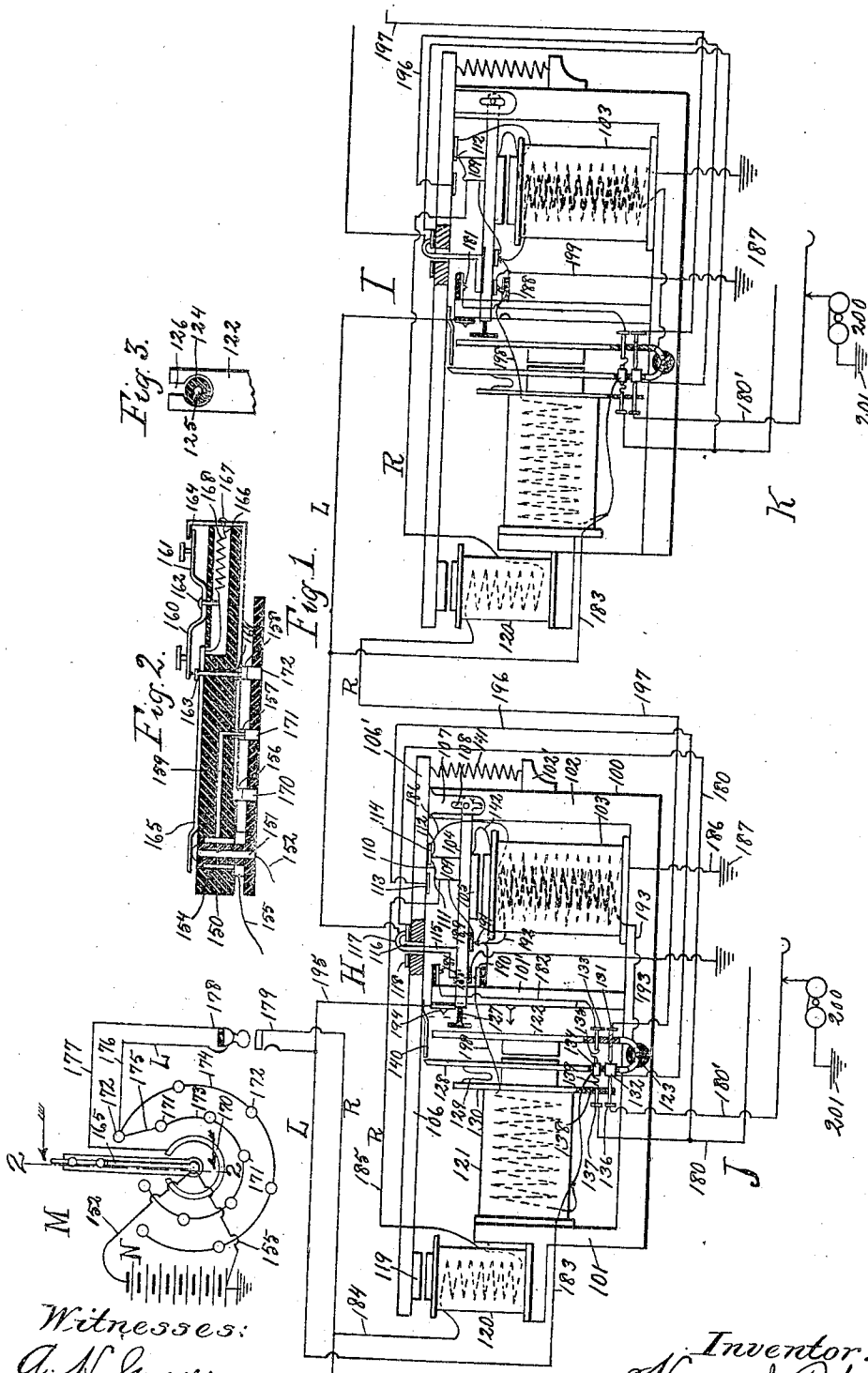


No. 837,251.

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H. J. ROBERTS.
TELEPHONE APPARATUS.
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Witnesses:
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UNITED STATES PATENT OFFICE.

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TELEPHONE APPARATUS.

No. 837,251.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HOMER J. ROBERTS, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Telephone Apparatus, of which the following is a specification.

This invention relates to improvements in telephone apparatus, and refers more specifically to improvements in selective party-line telephone systems.

Among the salient objects of the present invention are to provide a system in which the operator at central may select and call any one or more of the subscribers belonging to a given party-line at will and without signaling or otherwise giving notice to the remaining parties belonging to said line; to provide a system in which the operator at central may give to any one or two parties upon a given party-line the exclusive use of the lines, so as to prevent interference by other parties; to provide means in a system of the character last mentioned whereby the parties excluded are also cut out of the talking-circuit, so that surreptitious listening is prevented; to provide a system in which grounding connections and connections across the lines are cut off or opened in the act of selecting the parties, so that the main lines are electrically intact from central to the subscriber called, thus enabling a large number of subscribers to be placed upon the same party-line without seriously impairing the effectiveness of the working currents; to provide in a system of the character referred to means whereby two subscribers belonging to the same party-line may be properly connected to communicate with each other by the operator at central and at the same time the remaining parties locked out or excluded; to provide means for effectively clearing or restoring the instruments to normal condition after use and independently of or without the coöperation of the subscriber; to provide means whereby the operator at central may have such control over the several subscribers' instruments that a subscriber may cut off at will and during the use by him of his instrument, thus enabling the operator at central to prevent arbitrary or unreasonable retention of circuit connections by subscribers, and in general to provide improvements in the construction and arrangement of in-

strumentalities in a system of the character referred to.

To the above ends the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims and will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of one embodiment of the invention. Fig. 2 is a detail sectional view showing the construction of the operator's switch-key adapted for use in connection with the system shown in Fig. 1. Fig. 3 is a fragmentary detail showing the upper end of one of the armature-levers shown in Fig. 1 and the end of the coöperating armature-lever, the latter shown in section taken on line 2 2 of Fig. 1.

Referring to Fig. 1, H and I respectively designate selective instruments located at different subscribers' stations, and J and K designate as a whole so much of the corresponding subscribers' telephone sets as is necessary to an understanding of the invention. M designates a key mechanism located at central, and N a battery connected therewith. R and L designate the right and left main lines, leading from central to the respective subscribers' stations. Describing in detail one of the instruments H or I, 100 designates as a whole a suitable frame provided at each end with standards, as 101 102. 103 designates a primary magnet which is provided with a double winding. Upon the standard 102 is pivotally mounted an armature-lever 104, which is arranged to extend horizontally above the magnet 103 and carries an armature 105, adapted to coöperate therewith. Above the armature-lever 104 is arranged to extend a second and longer armature-lever 106, which, as herein shown, is provided with a downturned extension 107, having slotted engagement with the same pivot which carries the armature-lever 104, as indicated at 108, and is supported from the armature-lever 104 by means of an upstanding contact-plate 109, having an inclined upper end 110 and two contact projections or points 111 and 112, respectively. Upon the armature-lever 106 are mounted insulated contact-plates 113 114 in position to coöperate with said contact-points 111 and 112. The armature-lever 106 is further connected with the armature-lever 104 by means of a

link 115, which is rigidly connected with the lower lever and extends upwardly through a suitable aperture 116 in the upper lever and terminates in a hooked portion 117, which serves to limit the distance to which the armature-levers may be separated while permitting them to approach each other freely. The link 115 forms a conductor, as will hereinafter appear, and its hooked upper end is arranged to engage a contact-plate 118, forming the terminal of a circuit, as will also be hereinafter described. Upon the free end of the longer armature-lever is mounted an armature 119, which is acted upon by a magnet 120, mounted upon a suitable support extending out from the standard 101. Said magnet 120 performs the function of holding the armature-lever 106 during the operation of certain other elements and will therefore be hereinafter designated the "holding-magnet." 121 designates a third magnet, which is mounted upon the standard 101 and is arranged to actuate an armature-lever 122, which coöperates with the armature-lever 104 in a peculiar manner, said armature 122 being to this end arranged at right angles to the said armature-lever 104 and located adjacent to the swinging end of the latter. The armature 122 is conveniently pivoted to the base-frame, as indicated at 123, and is made relatively broad or of plate-like form at its upper end, as indicated in detail, Fig. 3, said upper end being provided with an aperture 124, adapted to permit the free passage therethrough of a correspondingly-shaped head 125, mounted upon the armature-lever 104. With the upper side of the aperture 124 communicating a vertical slot 126, which is of sufficient width to permit the free passage therethrough of a reduced neck-like portion 127, which unites the head 125 with the main body of the armature-lever 104. In the normal position of the armature-lever 122 the latter stands with its slotted apertured portion in vertical register with the neck portion 127 of the armature-lever 104, so that the latter may rise and fall without affecting the movement of the lever 122. In the normal or open position of the lever 104 the end thereof is in horizontal register with the upper-slotted end of the lever 122, and it follows, therefore, that the armature-lever 104 must be closed before the lever 122 is free to move into closed position, and, vice versa, if the lever 122 be closed while the armature-lever 104 is in closed position and the latter subsequently released, it will lock the lever 122 in closed position. 128 designates a contact-lever which is arranged to coöperate with the armature-lever 122, said contact-lever being conveniently pivoted at one end upon the same pivot 123 which supports the armature-lever, although insulated from the latter and from the point of support and being interposed between the armature-lever and the proximate end of the magnet-spool. In order to avoid interference with the pole-piece of the magnet, said contact-lever is apertured midway of its length to pass around or embrace the pole-piece without contacting therewith. A V or expansion spring 129, interposed between the contact-lever and a bracket-like extension 130 upon the magnet-spool, serves to hold or force the contact-lever toward the armature-lever, its approach to the latter being limited normally by means of an adjustable contact-screw 131, threaded through the armature-lever and engaging a contact device 132, mounted upon the contact-lever. The contact-screw 131 is insulated from the armature-lever, as shown. A somewhat similar contact-screw 133 extends through the armature-lever and engages a second contact device 134, mounted upon the contact-lever, this latter contact-screw being made yielding between its ends, as indicated at 135, and both the screw and contact with which it coöperates being insulated from their respective supports. 136 and 137 designate another pair of contact-screws mounted in a second extension 138 upon the magnet-spool and insulated therefrom, these two latter contact devices being arranged to coöperate with the contact devices 132 and 134, respectively, at the time the contact-lever 128 is forced outwardly or to the left by the closing of the armature-lever 122. In this case also the contact-pin 137 is made yielding between its ends, as indicated at 139. A mechanical detent is provided for locking the contact-lever 128 in depressed position, or in that position to which it is moved by the closing of the armature-lever 122, the said detent consisting of a spring-latch 140, mounted upon the under side of the long armature-lever 106 in such position as to project into the path of the end of the lever 128 when said lever is depressed or forced into closed position. When the armature-lever 106 is released, the catch or detent 140 is withdrawn from the path of the end of the lever 128 and permits the latter to return under the action of its spring. The armature-lever 106 has a limited rocking movement relatively to the armature-lever 104, so as to change the point of bearing between said members from the contact-point 112, which engages the plate 114, to the contact-point 111, which engages the plate 113, whenever the lower armature-lever 104 is released, while the upper armature-lever is held in closed position. To this end a slotted extension 107, hereinbefore described, is provided, and a contractile spring 141 is arranged to connect an extension 106' of the pivoted end of the armature-lever with a subjacent bracket 102'. Upon the standard 102 the lower armature 104 is acted upon by

an expansion-spring 142, interposed between its lower side and the upper side of the magnet-spool 103.

Next describing the construction and arrangement of a switch mechanism or connecting-key which is located at the central station and effects the making and breaking of the proper circuit connections for operating the selective instruments described, 150 designates as a whole the main body of the key, which is desirably constructed of insulating material and is pivotally connected at one end upon a suitable support so as to swing in a definite plane. The pivot-bearing of said connecting-key or switch-lever is of two-part construction, comprising an inner metallic stud 151, which is connected, by means of a conductor 152, with one side of the battery N, and a concentric member or ring 154, insulated from the stud 151 and connected, by means of a suitable conductor 155, with the opposite end of the battery N. Upon the under side of the connecting-key are mounted three separate contact plates or buttons 156, 157, and 158, plate 157 being electrically connected with the ring 154 by means of a conductor 159, shown as conveniently embedded in the body of the key. Upon the upper side and at the outer end of the connecting-key is mounted a pair of spring contact-strips, (designated 160 and 161,) these contact-strips being formed integrally with each other to extend longitudinally of the key in opposite directions and secured fixedly to the key at the central point by means of a suitable screw 162. 163 and 164 designate two fixed contact devices, respectively adapted to cooperate with the spring contact-strips 160 and 161, the strip 160 being arranged to stand normally in open position and to be closed when depressed and the strip 161 being arranged to stand normally in closed position and to be opened when depressed. The screw 162 is electrically connected with the pivot-stud 151 of the connecting-key by means of a conductor 165, thereby placing the contact-strips 160 and 161 in electrical connection with said stud 151. An extension-conductor 166 leads from the contact-screw 162 to a binding-screw 167, which serves to hold the contact device 164 in position, and from thence to and is connected with the contact-plate 156. A resistance-coil 168 is interposed between the securing-screw 162 and the contact-plate 156.

It will be seen from the foregoing that current entering through the stud 151 may be transmitted to the plate 156 either with or without interposed resistance, the circuit being shunted around the resistance-coil when the contact-strip 161 is in closed position, but compelled to pass through the resistance-coil when said contact-strip is in open position.

The contact-plate 163 is connected 65 with the contact plate or button 158 by means of a conductor 169.

Upon a suitable base or support over which the connecting-key is arranged to sweep is mounted a continuous contact-strip 170, arranged concentrically with the pivotal axis of the connecting-key and in register with the contact-plate 156, so that the latter forms continuous engagement therewith. 171 and 172 designate as a whole two series of contact-studs also mounted upon the base concentrically with the pivotal axis of the key and respectively arranged in register with the contact-plates 157 and 158. The contact-studs 171 and 172 are alternated radially, the first stud of the series 172 being so located as to be first engaged by the key when the latter is moved to the right from its normal or open position. The several members of each series of contact-studs 171 and 172 are connected with each other by means of conductors 173 and 174, and one series is connected with the other by means of a conductor 175. The two series of studs are adapted to be connected with the left main line through a conductor 176, and the continuous contact-strip 170 is likewise adapted to be connected to the right line by means of a conductor 177, these connections being made through a plug and jack, (designated, respectively, 178 and 179.)

Describing now the various circuits as they exist and are brought into use during the operation of the apparatus, it will be seen that the subscriber's left line is normally ready for communication with central when the subscriber's receiver is removed from the receiver-hook, the circuit being in such case traced as follows: from the subscriber's instrument over the conductor 180, leading to the contact-plate 118 of the armature-lever 106, thence through link 115 to a back contact 181, mounted upon an upright frame member 101', and from the latter contact by a conductor 182 to the contact-screw 133 of the armature-lever 122. From this contact-screw the circuit extends through contact device 134 and thence by way of a conductor 183 to the main left line. The subscriber is therefore enabled to ring central at will.

In calling the subscriber from central, the first operation is to energize the primary magnet 103 and close the armature 104, the holding-magnet 120 being at the same time energized and serving to retain the armature-lever 106 in closed position after it has been drawn down by the armature-lever 104 of the primary magnet. It may be explained at this point that the holding-magnet 120 is made of very low resistance, so that it interposes into the line only so much resistance as is necessary to securely hold its armature in position, and that owing to the fact that the

armature-lever is relatively long and the spring-pressure acting to open the same small said magnet may be made of very low resistance.

5 The circuit for energizing the primary magnet is closed when the operator at central moves the switch-lever key so as to bring the contact-plate 156 into bearing with the contact-strip 170, which, as hereinbefore described, is connected with the sleeve or right-hand side of the main line through the conductor 177. This circuit may be traced as follows: from ground at central through the battery to the stud 151 of the key over conductor 152, thence by way of conductors in the key to the contact-plate 156 and contact-strip 170, thence to line over conductor 177. From line at the subscriber's station a conductor 184 leads to and through the magnet 120, and thence a conductor 185 leads to the contact-blade 109. From the blade 109 the circuit is through contact-plate 114, and thence by way of conductor 186 to and through the coils of the primary magnet and thence to ground at 187 through a conductor 186, thus completing the circuit and energizing the two magnets 120 and 103. The closing of this circuit draws down armature 104, and with it, through the link 115, the armature-lever 106. The closing of armature-lever 104 opens a circuit at contact 181 and closes circuits at two contacts mounted upon the under side of the armature-lever 104 and respectively designated 188 and 189, the former being brought into bearing with a fixed contact 190 and the latter with a yielding contact 191.

In case central desires to pass on to a succeeding subscriber on the party-line the next step will be to close a circuit which will release the armature of the primary magnet, which is done by passing a current through the opposite windings of the latter magnet without interrupting the current which extends through this and the holding-magnet. This circuit is closed when the switch-lever is moved far enough to bring the contact-plate 157 thereof into contact with the first stud 171, which contact is connected with the left side of main line, as hereinbefore described. The contact-plate 158 will of course have made contact with stud 172, but owing to the fact that this circuit is open at contact-plate 163 the circuit will remain interrupted. The "neutralizing-circuit," as it may be properly called, is an all-metallic circuit and may be traced as follows: from battery at central over the right line the connections to contact-blade 109 are as hereinbefore described, at which point the circuit divides, one branch going to ground at 187 through one set of coils in the primary magnet and another branch extending through the armature-lever body 104 to contact-plate 189 and cooperating contact 191, thence through a

conductor 192 to and through the other set of windings of the primary magnet, and thence by way of a conductor 193 to the body of the armature-lever 122. The latter is at this time resting in contact with a back-contact device 194, mounted upon and insulated from the standard 101', and from this latter contact a conductor 195 leads back to the left main line. From the left main line at central the circuit is through conductors 176 and 175 to stud 171, thence through contact-plate 157 and conductor 159 to the outer pivot member 154 of the switch-key, and from the latter through conductor 155 to the opposite side of the battery N, thus completing the circuit. Inasmuch as the potential is thus equalized through the two windings of the primary magnet, the latter is de-energized and its armature moves into open position. In so doing the holding-magnet 120 is not released as hereinbefore described, and accordingly the upward movement of the link 115 opens the circuit extending through the same at the contact-plate 118. The circuits also are opened at the contacts 188 and 189, and the point of bearing between the armature-lever 106 and the armature-lever 104 is changed from the contact-plate 114 to the contact-plate 113 by reason of the relative rocking movement hereinbefore described. This change in position of the various parts results in extending the right-line circuit connections through to the next subscriber's instrument of the series, the continuation being traced as follows: from the contact-blade 109 through the contact-plate 113, thence by way of a conductor 196 to the contact device 132, mounted upon the contact-lever 128, which contact device 132 normally rests in bearing with the contact-screw 131. From the latter screw a conductor 197 leads on to the continuation of the main right line, which latter is connected with the succeeding instrument in the same relation as with the first. It follows, therefore, that since the switch-lever key is in continuous engagement with the contact-strip 170 the neutralizing of the primary magnet will result in closing the circuit to the next instrument and energizing its primary magnet.

Assuming now that the second instrument in the series is the instrument belonging to the subscriber wanted, the next operation will be to energize the connecting-in magnet 121 of that instrument so as to close the bell-circuit. The circuit energizing the connecting-in magnet may be traced as follows: from ground at central through the battery and several conductors to the spring-conducting-strip 160, and from the latter (when depressed) through contact 163, conductor 169, contact-plate 158 to contact-button 172, thence over the left line to a branch line 183 at the instrument in question, and from

the latter through the coils of the connecting-in magnet 121 to the conductor 198, which leads to the contact 190. From the contact 190 current is transmitted to contact 188, and thence by a conductor 199 to ground, thus completing the circuit from ground to ground. The energizing of magnet 121 closes the armature-lever 122 thereof and in so doing closes the circuit between the contact device 132, mounted upon the lever 122 and the cooperating contact-screw 136. The bell-circuit thus formed is from central over the right main line to blade 109 and plate 113, to conductor 196 and to said contact 132, thence to contact-screw 136, and from the latter over a conductor 180' to the right-hand side of the subscriber's instrument, and thence to and through the bell indicated at 200. The bell is connected to ground at its opposite side, as indicated at 201, and it is to be noted in this connection that it is necessary to use a biased bell which responds only to a direct pulsating current.

The clearing of the instrument after the subscriber has finished talking is accomplished by the operator at central, who simply returns the switch-lever key to its normal position. This deenergizes the holding-magnet 120, whereupon the armature-lever thereof rises, thus restoring the parts to their normal positions.

The foregoing operations are the ones which take place when the connection is to be made between a subscriber on the party-line and one on a different line. Obviously it is sometimes necessary to give connections between subscribers on the same party-line, and for this purpose special means are necessarily provided, as will now be described.

Assuming, for instance, that the subscriber at instrument H desires to communicate with the subscriber at the next instrument down the line, (designated I,) it will be necessary for central to retain the circuit connections with the first subscriber's telephone set while securing the proper connections with the subscriber at I. The subscriber at H calls central for connection in the usual manner, and central proceeds to make the connection as follows: The first movement of the switch-key closes the circuit through the primary magnet at the instrument at station H, as before. In this instance, however, instead of moving the switch-key to the position in which it forms contact with the contact-stud 171 the operator at central stops when its contact-plate 158 is in contact with stud 172, and while in this position depresses contact-strip 160. This energizes the connecting-in magnet in the manner hereinbefore described, and while the contact-strip 160 is thus held in closed position and the connecting-in magnet energized central depresses the connecting-strip 161, thereby opening the shunt around the resistance 168, or, in

other words, interposes the resistance 168 in the circuit which is at this time maintaining the primary and holding magnets energized. The interposition of the resistance 168 reduces the current sufficiently to release the primary magnet, but not the holding-magnet, whereupon the armature-lever 104 rises, thus bringing its headed end 125 opposite and behind the upper end portion of the armature 122. This results in locking the latter mechanically in its closed position, so that it will be held against opening when the circuit through the connecting-in magnet is opened. The operator at central now permits the two contact-strips 160 and 161 to assume their normal positions, then moves the key on to select the next party, and does this in precisely the same manner as though the latter party were the only one wanted. While the armature-lever 122 of the connecting-in magnet is thus mechanically held in closed position, it will be seen that the subscriber at instrument H is connected on to the next instrument and to central by circuits, which may be traced as follows: from the right-hand side of his own instrument to contact-screw 136, from the latter through contact 132 to the contact-screw 131, thence by way of conductor 197 to the right main line leading to the next instrument down the line. The other side may be traced from the left side of his set through conductor 180 to contact-screw 137 and contact device 134 and thence over conductor 183 to the left main line.

It will be seen from the foregoing description that I accomplish the several objects of the invention set forth and provide a system which may be adapted to any ordinary telephone-line at a very moderate expense and by the use of an apparatus of an extremely simple nature, and therefore not easy to get out of repair or adjustment. It will furthermore be seen that the details of the embodiment of the system may be very considerably modified without in any sense departing from the spirit of the invention, and accordingly I do not limit myself to the details of construction and arrangements herein shown except to the extent that they are specifically claimed.

This application is filed as a division of my prior application, Serial No. 123,958, filed September 18, 1902.

I disclaim invention of the combination of a line broken at a series of stations with non-polarized electromagnet mechanism adapted to build up a circuit through any desired number of said stations and non-polarized electromagnetic mechanism adapted to break said circuit at said stations.

I also disclaim invention of the combination with a central office of a series of local stations and a discontinuous conductor extending from the central office to the first

station and thence from station to station, two contact-makers at the central office, means whereby upon making a series of contacts by one of said contact-makers the sections of conductors will be united one by one into a continuous conductor, and means whereby upon making a contact with the second contact-maker simultaneously with a contact made by the first contact-maker the station corresponding to the section then being united will be electrically connected to the continuous conductor.

I also disclaim invention of the combination last above stated provided with means whereby upon making a series of single contacts the local stations will be excluded one by one from telephonic connection with said conductors, and means whereby upon making a double contact in the series of contacts the corresponding local station will be placed in telephonic connection with said conductors.

I claim as my invention—

1. In a party-line telephone system, the combination with a central station, a series of substations and a double line extending from "central" to and through the series of substations, of a selector instrument at each substation, each selector having a primary magnet and a holding-magnet, one limb of the double line extending from "central" to and through the primary magnet of the first station-selector and to ground, extension-sections of said limb extending from the first substation to and through the primary magnet of the next substation-selector and to ground, and in like manner from station to station of the succeeding stations, the other limb extending from "central" to the first instrument and normally open at the latter and extensions of this limb from substation to substation normally open at each instrument, and means controlled by said primary magnet whereby the disconnected sections of each limb may be united from station to station and other means whereby they may be united with each other at any desired station, for the purpose set forth.

2. In a party-line telephone system, the combination with a central station, a series of substations and a double line extending from "central" to and through the series of substations, of a selector instrument at each substation, each selector having a primary magnet and a holding-magnet, one limb of the double line extending from "central" to and through the primary magnet of the first station-selector and to ground, extension-sections of said limb extending from the first substation to and through the primary magnet of the next substation-selector and to ground, and in like manner from station to station of the succeeding stations, the other limb extending from "central" to the first instrument and normally open at the latter

and extensions of this limb from substation to substation normally open at each instrument, and means controlled by said primary magnet whereby the disconnected sections of each limb may be united from station to station and other means whereby they may be united with each other at any desired station, and at the same time the circuit shunted around the chief resistance of the intervening selector instruments, for the purpose set forth.

3. In a party-line telephone system, the combination with a central station, a series of substations and a double line extending from "central" to and through the series of substations, of a selector instrument at each substation, each selector having a primary magnet and a holding-magnet, one limb of the double line extending from "central" to and through the holding and primary magnets of the selector at the first substation and to ground, extension-sections of said limb extending from the first substation instrument to and through the holding and primary magnets of the next substation-selector in order and to ground, and in like manner from station to station of the succeeding stations, a double armature having two parts capable of movement independently of each other controlled by each primary magnet, one member of each such double armature being also controlled by the corresponding holding-magnet, contact devices for uniting the sections of said limb of the line controlled by that member of each armature which is not controlled by the holding-magnet and means for establishing neutralizing-circuits through the primary magnets.

4. In a party-line telephone system, the combination with a line-wire and a suitable source of current, of a series of selective instruments each normally in operative connection with said line-wire, electrically-actuated means in each instrument operative to cut out functionally the subscriber's set controlled thereby, subsidiary electrically-actuated mechanism for restoring the line connections of a given subscriber's set and at the same time locking his selective instrument against functional movement by the cutting-out operations as to succeeding instruments, whereby two subscribers upon the same line may be placed in communication to the exclusion of others, and means for restoring the instruments to normal position.

5. In a party-line telephone system, the combination with a line-wire and a suitable source of current, of a selective instrument normally in operative connection with said line-wire and comprising a primary magnet, an armature controlled thereby, a contact-lever actuated by said armature, a secondary magnet and armature, a contact-lever actuated by said secondary magnet, a mechanical locking device for holding one of said contact-levers in a definite position, and elec-

trically-actuated means for releasing said mechanical locking device, for the purpose set forth.

5 6. In a party-line telephone system, the combination with a line-wire and a suitable source of current, of a selective instrument normally in operative connection with said line-wire and comprising a primary magnet, an armature controlled thereby, a contact-
10 lever actuated by said armature, a secondary magnet and armature, a contact-lever actuated by said secondary magnet, an automatically-engaging locking device for holding the contact-lever of the primary magnet in
15 that position to which it is shifted by the movement of the armature of said magnet, means tending to restore the armature-lever of the magnet to its normal position, contact devices actuated by said armature-lever, and
20 means for disengaging said locking mechanism and restoring the parts to their normal positions.

7. In a party-line telephone system, the combination with a line-wire and a suitable
25 source of current, of a selective instrument

operatively connected with said line-wire and comprising a primary magnet, a signaling device, an armature operated by said primary magnet, contact devices actuated by said armature and controlling the circuit through
30 said signaling device, a second magnet of relatively low resistance, an armature-lever actuated thereby, and means controlled by said second magnet for restoring parts of the instrument to normal position.

8. In a telephone system, the combination with a magnet and vibratory armature, of a lever mounted adjacent to said armature and yieldingly held in bearing with a part thereof, a spring-latch mounted adjacent to said con-
40 tact-lever and adapted to engage and hold the latter when shifted in one direction by the armature-lever, circuit connections controlled by said contact-lever, and means for releasing said spring-latch.

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