

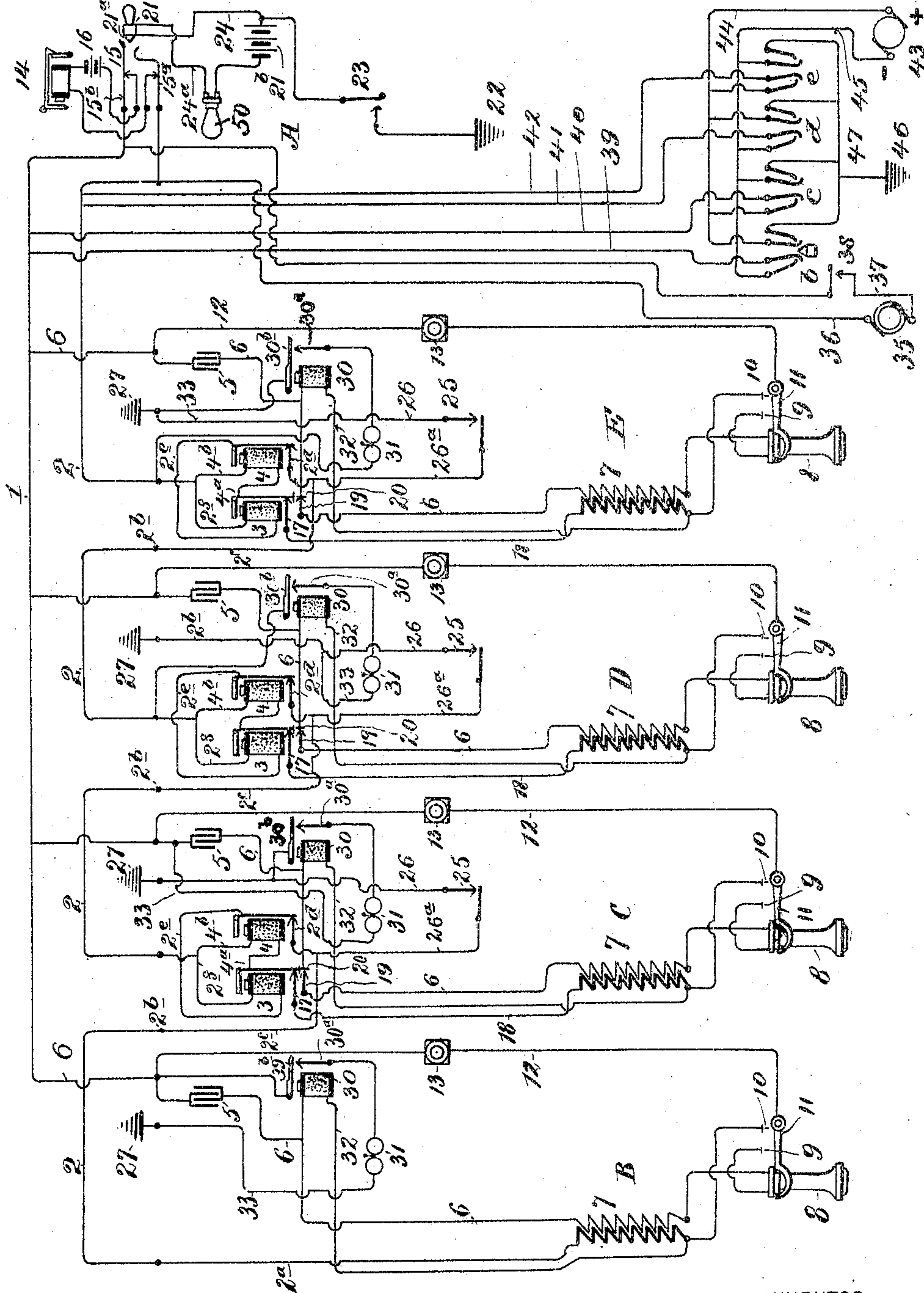
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G. M. CROCKETT.  
TELEPHONE SYSTEM.

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NO MODEL.



WITNESSES:

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## TELEPHONE SYSTEM.

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*To all whom it may concern:*

Be it known that I, GEORGE M. CROCKETT, a citizen of the United States, and a resident of New York city, borough of Manhattan, New York, have invented certain new and useful Improvements in Telephone Systems, of which which the following is a specification.

My invention relates to improvements in what are commonly called "party-line" telephone systems; and it has for its object to permit one subscriber on a party-line to use the line to the exclusion of the other subscribers, thus to prevent them from listening in, except, of course, when two subscribers on a party-line are to communicate with each other.

To these and other ends my invention comprises the novel details of improvement and arrangements of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawing, forming part hereof, which presents a diagrammatic view of a telephone party-line system embodying my invention.

In the drawing the central office is indicated generally at A and the subscribers' stations at B, C, D, and E, suitable jacks and other well-known appliances that may be necessary in the operation of the system being located at central. The conductors of a party-line are indicated generally at 1 2 and are connected with circuit-controlling instruments in the various stations. In the station or stations between central and the last station on the line are located two relays or magnets 3 4, connected with the line 2 in such manner that when a receiver is removed from its hook in a station having such relays, the corresponding relay 4 will operate to cause the circuit 2 to be broken on the side farthest from central to prevent subscribers on that side from obtaining circuit to central, and at such time the relays 3 in the stations on the side toward central will operate to cut out the receivers thereat, whereby subscribers at such stations are prevented from listening in. At the last station on the line or the farthest from central, as B, said relays are not required, but

the relays 3 in the other stations are operated from such station.

The line 1 leads through all the stations and is connected with a condenser 5 by a line 6, leading to the secondary coil of an induction-coil 7, which is connected with a receiver 8 at the corresponding station. A contact 9, connected with the receiver, and a contact 10, connected with the primary of said induction-coil, are adapted to be placed in circuit by the receiver-hook 11 in well-known manner. The conductor 12 of the transmitter 13 connects with hook 11 and with line 1 for a local circuit in well-known manner.

The line 2 at station B is connected by a conductor 2<sup>a</sup> with the primary of the induction-coil 7. At the other stations the line 2 connects with the relays 3 as follows: From a binding-post 2<sup>b</sup> at one station a conductor 2<sup>c</sup> leads to a contact 2<sup>d</sup> in normal engagement with the armature of relay 4, which armature by a conductor 2<sup>e</sup> connects with relay 3, a conductor 2<sup>f</sup> connecting said relay with line 2, leading to post 2<sup>b</sup> in the next station, and so on at each station. It will thus be seen that line 2 is normally closed through the relay 3 in each station having such a relay, and in station B said line is open at 10.

When the receiver in station B is removed from its hook, a closed circuit will be established from line 1 through 12, 11, 10, primary of the coil, and 2<sup>a</sup> to line 2, and thence in each station through 2<sup>c</sup>, 2<sup>d</sup>, 2<sup>e</sup>, relay 3, 2<sup>f</sup>, and line 2 to central, and contact 15<sup>a</sup> of jack 15 to the signaling instrument 14 and battery 16, and thence through contact 15<sup>b</sup> of the jack to line 1. A relay 3 when operated from a calling-station is arranged to break the circuit of its corresponding receiver or its primary coil as follows: The armature of relay 3 is normally in circuit with a contact 17, that is connected by a conductor 18 (corresponding to 2<sup>a</sup> at B) with the primary of the corresponding coil 7. The conductor 6, (in stations except B,) connected with the corresponding secondary of coil 7, has a contact 19, normally in circuit with a contact 20, carried by and insulated from the armature of relay 3. Thus when a relay 3 is energized in a station beyond the



operating-station its armature breaks the circuit of the coils 7 at 17 19 at such station or stations and cuts out the corresponding coil and receiver, line 2 remaining closed from the calling-station to central. It will be observed that relay 3 in an operating or calling station does not operate, as the circuit in such station from its primary of coil 7 is through relay 4 to line 2 and not through relay 3 in such station.

The relay 4 in each station is controlled by the receiver thereat for breaking the circuit of line 2 on the side farthest from central when such receiver-hook rises, (but at such time the relay 3 in the operating-station does not operate.) The arrangement for this purpose is effected by means of a conductor 4<sup>a</sup> connecting one terminal of the corresponding relay 4 with the armature of the associate relay 3, a conductor 4<sup>b</sup> connecting the opposite terminal of said relay 4 with line 2. The armature of relay 4 coacts with the corresponding contact 2<sup>d</sup> to control the circuit of line 2 to the left in the drawing. Thus when a receiver is removed from its hook and circuit is closed through the corresponding primary coil a closed circuit in a station will be established from line 1 through 12, and hook 11 to the primary coil and through 18, 17, armature of relay 3 4<sup>a</sup>, relay 4 and 4<sup>b</sup> to line 2, and through any intervening stations to central and through the jack, instrument 14 and battery 16 to line 1, relay 4 at the operating or calling station, thus breaking the circuit of line 2 to the left in the drawing to prevent another subscriber on that side from obtaining a circuit for his receiver.

The operation of my improvement above described is as follows: Assume that the subscriber at the station farthest on the line from central, as B, desires to call central. He raises the receiver from its hook, whereupon a closed metallic circuit will be established from line 1 through 12, hook 11, primary of coil 7, 2<sup>a</sup>, to 2 and to 2<sup>b</sup>, thence at station C through 2<sup>c</sup>, 2<sup>d</sup>, 2<sup>e</sup>, relay 3, 2<sup>f</sup>, to line 2, and similarly through stations D and E to the signaling instrument 14 and battery 16 at central back to line 1. All the relays 3 thereupon operate to cut out the coils 7 in stations C, D, and E, which will remain cut out so long as the receiver at station B is removed from its hook. The subscribers between station B and central are thus cut out and cannot reach central or listen in. If the subscriber at station C desires to use the line, he raises his receiver from its hook and thereupon establishes a circuit at such station from line 1 through 12 and the primary of 7 to 18, thence through 17, armature of relay 3, 4<sup>a</sup>, relay 4 and 4<sup>b</sup> to line 2, thence to station D and thereat through 2<sup>d</sup>, armature of relay 4, 2<sup>e</sup>, relay 3 and 2<sup>f</sup> to line 2, and similarly in station E, thence through instrument 14 and battery 16 at central back to line 1, whereupon the relay 4 in station C

operates to break the line 2 at 2<sup>d</sup> on the side toward station B to cut out the instrument at that station, and relays 3 in stations D and E operate to cut out the coils 7 at such stations, and thereupon all subscribers on the line except the calling subscriber are cut out and cannot listen in. If the subscriber at station D or E desires to use the line, operations similar to that last described occur upon the corresponding receiver being raised, relay 4 of the operating-station cutting out the stations on the side farthest from central and relay 3 at the station on the side toward central cutting out the intervening receiver. When the receiver is removed from the hook nearest central, as E, only the relay 4 thereat operates to cut out the stations at the left in the drawing. It will be understood that when the operator at central answers a call she places the plug 21 in jack 15 and breaks the circuit of battery 16, whereupon the battery 21<sup>b</sup> of the plug cord-circuit replaces battery 16. When a subscriber has finished using a line and hangs his receiver upon its hook, the line is broken and the armature of relays 3 4 falls back to restore the line to the normal condition.

For permitting one subscriber on a party-line to communicate with a subscriber on the same line the following arrangements are provided: 23 indicates a switch or push-button connected with ground 22 and with a strand 24 of the plug cord-circuit that connects with the tip 21<sup>a</sup> of plug 21, which tip is adapted to engage the spring 15<sup>a</sup> of jack 15, that is connected with line 2 at central. At the subscribers' stations, except the farthest on the line from central, a switch or push-button 25 is connected by conductor 26 with ground at 27 and with conductor 2<sup>c</sup> by wire 26<sup>a</sup>. If a subscriber should desire to call a station farther along the line from central than his own station, (as E wanting D,) he removes his receiver from its hook, thereby calling central and operating his relay 4, which breaks the line to D. The operator at central will then place plug 21 in jack 15 and ascertain the desired call. The calling subscriber will then hang his receiver upon its hook to give the central operator the line, and the operator will then call the desired subscriber and close switch 23. The calling subscriber E will remove his receiver from its hook and close his switch 25, and thereupon a circuit will be established from battery 21<sup>b</sup> through switch 23 and ground 22 to ground 27 at the calling-station E and through 25 26<sup>a</sup> to 2<sup>c</sup>, and thence through 2 and relay 4 at the called subscriber's station D, through 4<sup>a</sup>, 18, the primary of coil 7, hook 11, wire 12, transmitter 13, back to line 1, and thence to the jack at central and through plug-cord strand 24<sup>a</sup> to the battery, thus including the telephone instruments at D, and the circuit for the telephone instruments at E will be



from battery 21<sup>b</sup> through cord 24, to tip 21<sup>a</sup> of the plug, to spring 15<sup>a</sup> of the jack and over line 2 to 4<sup>b</sup>, at E, through relay 4, 4<sup>a</sup>, 17, 18, primary of coil 7, hook 11, and wire 12 and transmitter 13 to line 1, thence back to central through spring 15<sup>b</sup> of the jack, sleeve 21 of the plug, strand 24<sup>a</sup>, and signal 50 back to battery 21<sup>a</sup>. There is thus a complete circuit for E and D, the lines 1 and 2 being used for E and line 1 and the ground for D. With the circuit so established the two subscribers can converse. If a subscriber desires to communicate with a subscriber on the line nearer central, (as D wanting E,) he removes his receiver, (which cuts out E by the relay 3 at E,) and after announcing the call he hangs his receiver on its hook to give central the line. The operator at central then calls E and closes switch 23. The subscriber at E then removes his receiver from its hook, presses his button 25, and the subscriber at D again removes his receiver from its hook, and a circuit similar to that above described through grounds 22 and 27 for such stations will be established. It will be understood that the calling subscriber hangs his receiver back upon its hook after announcing his call to restore the line, so that the operator at central can call the desired subscriber, and thereafter the calling subscriber takes his receiver from its hook for conversation with the called subscriber. If the subscriber at station E desires to communicate with the subscriber at station C, he removes his receiver from its hook, thereby calling central, operating his relay 4, which breaks the line on the side farther from central, then announces the call and hangs his receiver upon its hook, and the operator at central will call station C and close switch 23, as before described. The calling subscriber E will next remove his receiver from its hook and close his switch 25, and the circuits for stations E and C will be as follows: for station E, from central over line 1 to station E, through its transmitter 13, receiver-hook 11, primary coil 7, through 18, 17, relay 4, wire 4<sup>b</sup> and back over line 2, to central, (the plug being in the jack at central,) and for station C the circuit will be from central over line 1, through the transmitter 13 at C, receiver-hook 11, primary coil 7, 18, contact 17, through relay 4 and wire 4<sup>b</sup> to line 2, thence to 2<sup>c</sup> at station D, through contact 2<sup>d</sup>, the armature and wire 2<sup>e</sup>, relay 3, 2<sup>f</sup> and line 2 to E, thence through 2<sup>c</sup>, 26<sup>a</sup>, switch or button 25, wire 26 to ground 27, and thence to ground 22 at central, through switch 23 and the battery to the plug and jack back to line 1. As the circuit for station C includes relay 3 at station D, the latter causes circuit to be broken at 17 at D, thus cutting out the telephone instruments thereat, and the relay 4 at C breaks the line to station A.

While any suitable means may be provided to enable central to call substations on a

party-line, I have shown arrangements as follows, which utilize pulsating currents and polarized bells: At each station is a relay 30 to control the circuit of the corresponding bell or signaling instrument 31. At stations B and D the contact 30<sup>a</sup> of relay 30 is connected with ground at 27 through bell 31 by conductor 33, while in station C the contact 30<sup>a</sup> is connected through bell 31 by conductor 33 with line 1, and in station E contact 30<sup>a</sup> is connected through bell 31 with line 2. Relay 30 in each station is connected at one terminal by a conductor 32 with contact 10, and the other terminal is connected with conductor 6, and thus the circuit of the relays in stations C, D, and E is controlled by the corresponding contact 20. At the central office an alternating-current generator 35 is connected at one pole with line 2 by a conductor 36, and the other pole is connected with line 1 by a conductor 37, having a switch 38. When switch 38 is closed, an alternating current is sent on the line, and the armatures 30<sup>b</sup> of the relays 30 are all put into vibration, rapidly making and breaking the circuit. At central keys *b c d e* are located, corresponding to stations B C D E, the appropriate contacts of keys *b c*, being connected by conductors 39 and 40 with line 1, and the appropriate contacts of keys *d* and *e* are connected with line 2 by conductors 41 and 42. One side of a generator 43 is connected, as by a conductor 44, with contacts of said keys, and the other side of the said generator is connected by a conductor 45 with other contacts of said keys. Appropriate contacts of each of said keys are also connected with ground at 46 by a conductor 47. When the operator at central desires to call a subscriber she closes switch 38 and operates the corresponding key. If station B is to be called, the key *b* is to be operated, whereupon line 1 will be connected with the negative side of generator 43 and the positive side of the generator will be connected with ground 46, and thereupon the bell 31 at said station will operate. If station C is to be called, the key *c* is operated and the positive side of generator 43 will be connected with line 1 and the negative side of the generator with ground 46 and bell 31 at station C will be operated. If station D is to be called, the key *d* will be operated, connecting the negative side of generator 43 with line 2 and the positive side with ground 46, and by operating key *e* the positive side of the generator will be connected with line 2 and the negative side with ground 46, with corresponding operation of the bells at station D or E.

While I have illustrated my improvements as adapted for use in a party-line having four stations, it will be obvious that more or less stations may be used by arranging the parts and circuits in the manner set forth, and in such case any suitable system may be provided



for calling the subscribers, or the calling system shown may be utilized with such alterations as may be required—as, for instance, ringing in two or more stations simultaneously in well-known manner. A clearing-out signal is shown at central A as a lamp 50 in circuit with strand 24<sup>a</sup> of the plug cord-circuit.

Having now described my invention, what I claim is—

10 1. A telephone system comprising a pair of lines leading from a central office for a plurality of substations and terminating at a station, telephone instruments at such stations, and a relay at a station connected with the  
15 corresponding telephone instruments and with one of the main lines arranged to break the circuit at its station of the station or stations farther on the line from central upon the closing of the circuit of the telephone instruments  
20 at the corresponding station.

2. A telephone system comprising a pair of lines leading from a central office for a plurality of substations and terminating at a station, telephone instruments at such stations, and a relay at a station in circuit with a main  
25 line arranged to break the circuit of the telephone instruments at such station upon the closing of the circuit of the telephone instruments at a station farther on the line from  
30 central.

3. A telephone system comprising a pair of lines leading from a central office for a plurality of substations and terminating at the station farthest from central, telephone instruments at such stations, a relay at a station connected with the corresponding telephone instruments and with one of the main  
35 lines arranged to break the circuit of the station or stations farther on the line from central upon the closing of the circuit of the telephone instruments at the corresponding  
40 station, and a relay at said station in circuit with a main line arranged to break the circuit of the telephone instrument at such station upon the closing of the circuit of the telephone instruments at a station farther on the  
45 line from central.

4. A telephone system comprising a pair of lines leading from a central office for a plurality of substations and terminating at one station, telephone instruments at said stations, and a pair of relays at substations, one of said relays at each of such stations being connected with one of said lines and arranged to break  
55 the circuit of the telephone instruments thereat, and the corresponding relay being normally in circuit with such telephone instruments and arranged to break the circuit of one of said lines when the corresponding telephone instruments are operated.  
60

5. A telephone system comprising a pair of lines leading from a central office for a plurality of substations, telephone instruments at said stations, a pair of relays at the stations  
65 between central and the last station on the

line, one of each pair of relays being normally in circuit with the induction-coil of the corresponding telephone instruments and arranged to break the circuit of one of said lines on the side farthest from central upon  
70 the corresponding telephone instruments in its substation being operated, the other relays of such pairs being normally in circuit with a line and arranged to break the circuit of the induction-coil in a station or stations nearer  
75 central to cut out such coil when the telephone instruments in a station farther from central are operated.

6. A telephone system comprising a pair of lines leading from a central office for a plurality of substations, telephone instruments at such stations, a relay in the main line in certain of said stations arranged to break the circuit of the corresponding telephone instruments when current is sent on the line from a  
80 station farther from central, and an associate relay in such station normally in circuit with the induction-coil thereat and having means to control the circuit of the main line to break such circuit on the side farther from central  
85 when the corresponding telephone instruments are used.

7. A telephone system comprising a pair of lines leading from a central office for a plurality of substations, telephone instruments  
90 at such stations, a pair of relays at a substation, one of which relays is normally in circuit with the telephone instruments thereat and with a main line and provided with means to break such line when the relay is operated to  
95 cut out substations on the side farther from central, the other relay of the pair being normally in circuit with such main line and provided with means to cut out the associate telephone instruments when energized by current  
100 sent on the line from a station farther from central.

8. A telephone system comprising a pair of lines leading from a central office for a plurality of subscribers' stations, telephone instruments at such stations, a contact connected with the telephone instruments at a station, a relay normally in circuit with one of such lines arranged to break the circuit of the corresponding telephone instruments at such  
105 contact, an associate relay at such station normally in circuit with the telephone instruments thereat and with said line, and a contact connected with such line at such station arranged to break the circuit of the line when  
110 said second-named relay is energized upon the corresponding telephone instruments being used.

9. A telephone system comprising a pair of lines leading from a central office for a plurality of substations, telephone instruments at such stations, a relay at a station connected with the corresponding telephone instruments and with one of the main lines arranged  
115 to break the circuit of the line for the station  
120  
125  
130



or stations farther on the line from central upon the operation of the corresponding telephone instruments in a station, a switch at one of said stations connected with ground and  
5 with said main line, a switch at central connected with ground, and means for connecting said switch with said main line, whereby two substations on a party-line may have their telephone instruments connected in circuit.

10 10. A party-line telephone system comprising a central office and substations connected by main lines, telephone instruments at such stations, said lines terminating and being normally open at the telephone instruments at  
15 the station farthest from central, and a relay at a station connected with a main line and with the telephone instruments thereat and out of circuit with the telephone instruments at a different station arranged to break the  
20 circuit of a line on the side farther from central upon the closing of a circuit of the telephone instruments at the corresponding station and to restore such line upon the circuit of such telephone instruments being broken.

25 11. A party-line telephone system comprising a central office and substations connected by main lines, telephone instruments at such stations, said lines terminating and being normally open at the telephone instruments at  
30 the station farthest from central, and a relay at a station connected with a main line out of circuit with the telephone instruments at such station and arranged to break the circuit of the telephone instruments from the line at  
35 such station upon the closing of the circuit of the telephone instruments at a station farther along the line from central and to restore the circuit of such telephone instruments with the line upon the breaking of the circuit of the  
40 telephone instruments at said station farther along the line.

12. A party-line telephone system comprising a central office and substations connected by main lines that terminate at a station and  
45 connect with a battery at central, telephone instruments at such stations, and a relay at a station connected at one terminal with the telephone instruments thereat and at the other terminal with a main line and thus with the  
50 battery at central arranged to break the circuit of the main line when the circuit of the corresponding telephone instruments are closed and to restore such circuit when the circuit of said telephone instruments is broken.

55 13. A party-line telephone system comprising a central office and substations connected by a pair of lines that terminate at the station farthest from central, telephone instruments at such stations, and a relay at a station farther  
60 from central connected with a main line and normally in circuit with the telephone instruments at a different station and with a battery

at central arranged to break the circuit of the telephone instruments from the line at the corresponding station upon the closing of the circuit of the telephone instruments at such different station. 65

14. A party-line telephone system comprising a central office and substations connected by a pair of lines that terminate at the station  
70 farthest from central, telephone instruments at such stations and a relay at a station connected with a main line out of circuit with the telephone instruments at such station and normally in circuit with the telephone instruments at a different station farther from central and with a battery at central arranged to  
75 break the circuit of the telephone instruments from the line at the corresponding station upon the closing of the circuit of the telephone instruments at such different station and to restore the circuit of such telephone instruments with the line upon the breaking of  
80 the circuit of said telephone instruments at said different station. 85

15. A telephone system having a pair of main lines leading from a central office for a plurality of substations, telephone instruments at such stations, one of said lines being provided with a contact at a station providing a  
90 normally closed circuit for such line, means for breaking the circuit of such line on the side of a station farther on the line from central upon the operation of the telephone instruments in such station, and a relay at a station in circuit with said line arranged to prevent the telephone instruments in such station from being used upon the closing of the circuit of the telephone instruments at a station farther on the line from central, substantially as described. 100

16. A telephone system having a pair of main lines leading from a central office for a plurality of substations, telephone instruments at such stations, one of said lines being  
105 provided with a contact in each of a number of such stations providing a normally closed circuit for such line, means at each of such number of stations for breaking the circuit of such line on the side of a station farther on  
110 the line from central upon the operation of the telephone instruments in either of such substations, and a relay in each of said number of stations in circuit with said line arranged to prevent the telephone instruments in a station or stations from being used when the telephone instruments at a station farther on the line from central are operated, substantially as described. 115

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