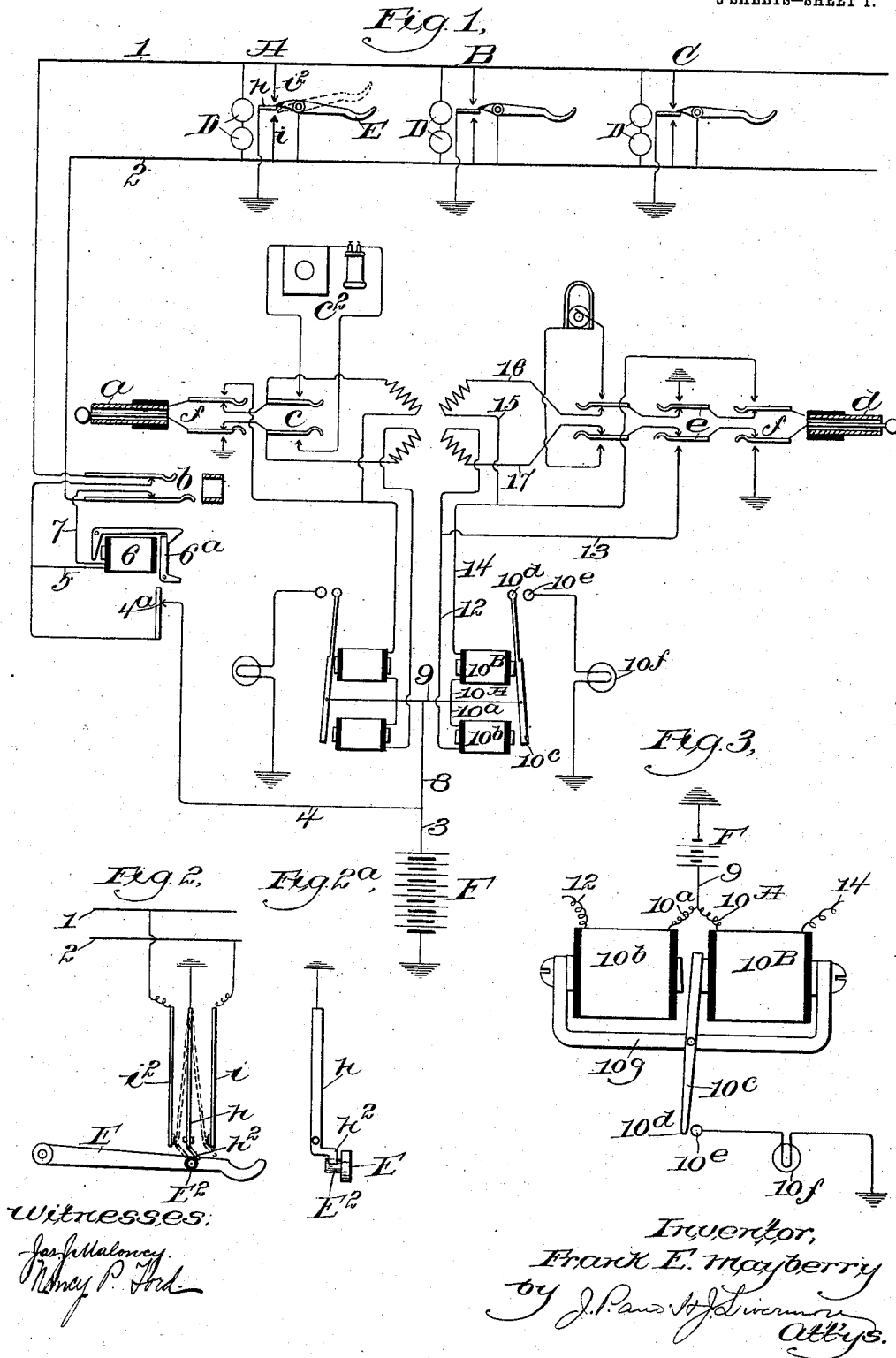


No. 867,892.

PATENTED OCT. 8, 1907.

F. E. MAYBERRY.
TELEPHONE SYSTEM.
APPLICATION FILED AUG. 11, 1902.

3 SHEETS—SHEET 1.

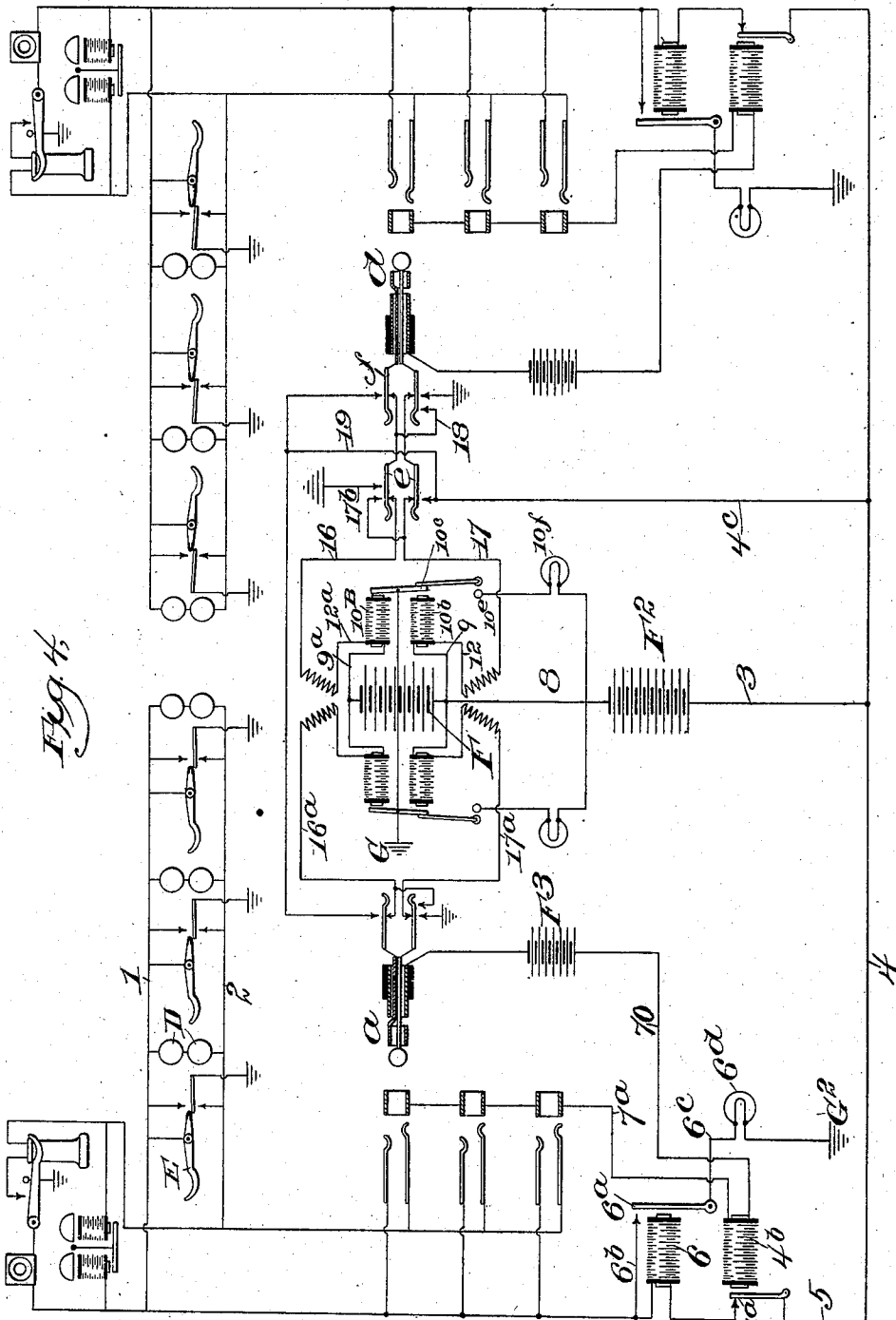


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3 SHEETS—SHEET 2.



Witnesses:
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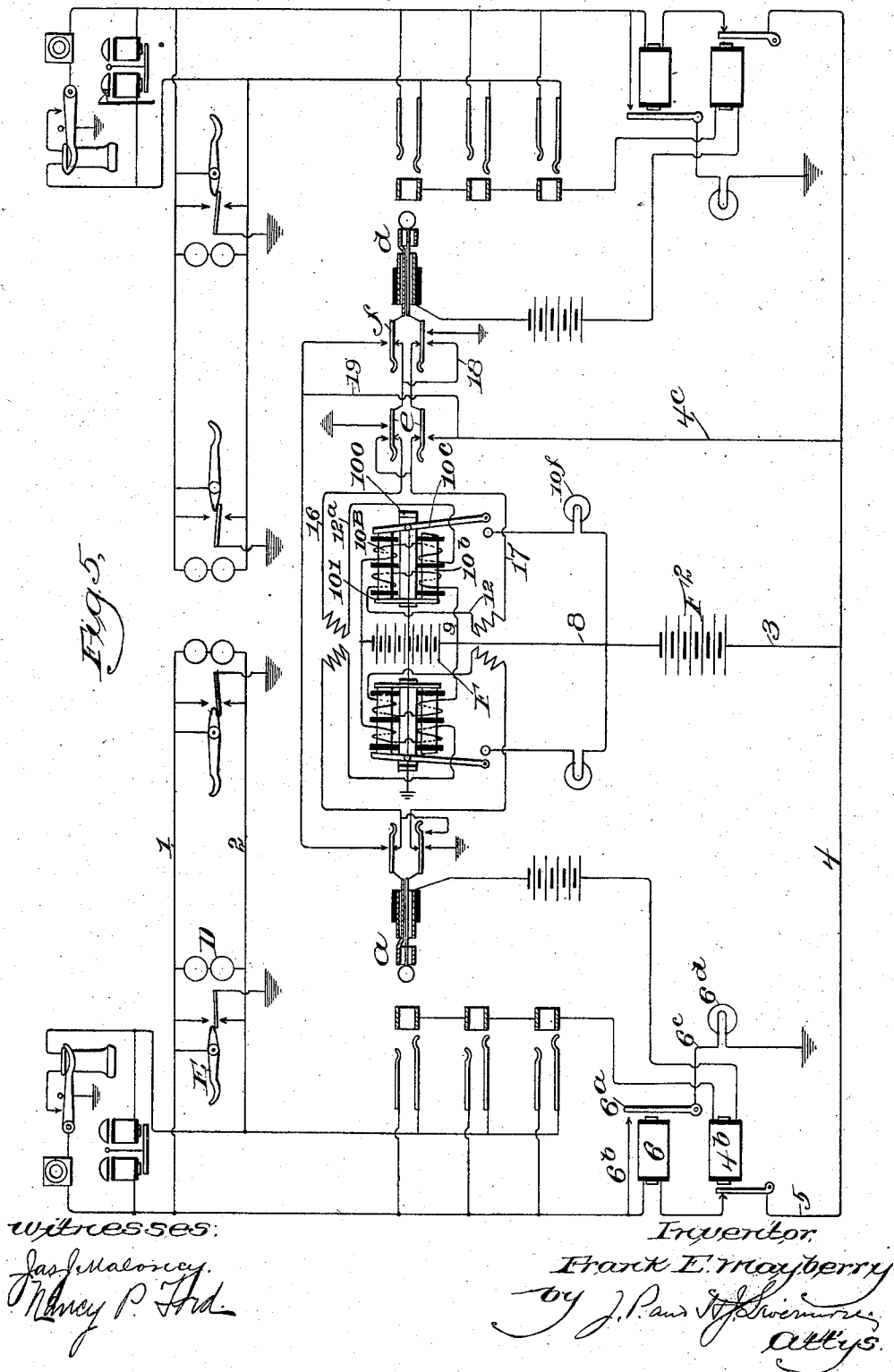
Inventor:
Frank E. Mayberry
by *J. P. and H. J. Swann* Attorneys.

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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

FRANK E. MAYBERRY, OF MEDFORD, MASSACHUSETTS, ASSIGNOR TO BOSTON TELEPHONE SELECTOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

TELEPHONE SYSTEM.

No. 867,892.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed August 11, 1902. Serial No. 119,248.

To all whom it may concern:

Be it known that I, FRANK E. MAYBERRY, of Medford, county of Middlesex, and State of Massachusetts, have invented an Improvement in Telephone Systems, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a telephone system, and is embodied in a party line system provided with selective controlling devices whereby a line having a number of stations can be controlled by a calling or called subscriber at any one station, to the exclusion of the other stations, while the line is in use.

The controlling devices employed are adapted to be operated by current flowing in one direction through circuits at the several stations, and to be restored by current flowing in the opposite direction through the stations substantially as described in a prior patent, No. 691,281, granted to me January 14, 1902.

The present invention relates mainly to the devices located at the central office, the purpose of the invention being to afford an effectual double supervisory system in connection with the controlling mechanism, so that the operator may be informed when conversation has been finished.

The invention further relates to a novel arrangement whereby the controlling system, shown and described in the prior patent above referred to, can be adapted to a central energy or common battery telephone system with or without a suitable double supervisory system such as is now usually employed in the common battery system at present in use.

In accordance with the invention, each cord circuit at the central office is provided with two signals for supervisory purposes, the said signals being herein shown as electric lamps, and hereinafter referred to as lamps, with the understanding that any other form of signal might be employed. One of the said lamps of each cord circuit corresponds to the called subscriber's line, while the other corresponds to the calling subscriber's line, the arrangement being such that when either subscriber has finished his conversation and hung up his receiver, the lamp belonging to his line will be lighted, so that when both lights appear, the operator at central will know that both parties have finished, and that the lines may be disconnected. The calling subscriber's lamp is not lighted in the beginning for the reason that the operator is in communication with the calling subscriber prior to connecting the two lines, and consequently has no need of further information as to whether the said subscriber is present or not. The called subscriber's lamp, on the other hand, is lighted in response

to the device operated at central office for controlling the several instruments along the called subscriber's line, in order to select the right one, the said lamp then being under the control of the called subscriber's switch-hook so as to be extinguished when the receiver is removed, thus notifying the operator at central office that the said called subscriber has answered. At this period, both of the lamps are extinguished, but both are under control respectively of the instruments at the connected subscribers' stations, so as to be lighted when the said subscribers hang up their receivers. Both lamps having been lighted, and the operator thus notified that conversation has been finished, the restoring device, for restoring the controllers along both lines to normal condition, is then operated, and both lamps are under the control of said restoring device so as to be extinguished when said device is operated prior to the removal of the plugs of the cord circuit.

The lamps are controlled by armatures under the influence of pairs of electro-magnet coils, the said armatures being adapted to be moved in one direction or the other in accordance with the preponderance of current in one coil or the other, the arrangement of the said electro-magnet coils being novel and forming a part of the present invention as will be hereinafter more fully described.

When the system is arranged to operate wholly on the common battery plan, that is to say, when the current for talking is supplied from the central office, the electro-magnets, which control the supervisory lamps are continually energized by the talking current, but the said current is equally divided between the coils, so that the armatures are not affected until a preponderance of current in one or the other is produced by the closure of the supplemental circuit controlled by the switch hook at a station on the line.

In the common battery system, in accordance with this invention, the signal at central office is controlled by a circuit including a third conductor, such as a ground, which is adapted to constitute one side of a circuit momentarily closed when the receiver is removed from the hook, so that the use of the condenser commonly employed in the common battery system is obviated, the battery being disconnected from the line except when the cord circuit plug is in. This renders it practicable to employ the controlling devices permanently bridged across the line in accordance with the system described in the prior patent above referred to, which would obviously not be practicable in the ordinary common battery system where the battery current is on the line all the time, but prevented from flowing by the condensers at the several stations.

The controlling devices, moreover, are arranged to require for their operation a stronger current than that used for talking, so the talking current on the line will not affect them. The circuit by which these devices
5 are controlled, however, contains an additional source of energy not in the regular line circuit.

When a lamp is utilized for the signal at central, the lighting of the lamp, in response to the momentary closure at the station of the special circuit, results in
10 the closure of a local circuit at central which maintains the lamp lighted until the plug has been inserted, so that the result is substantially the same as in the ordinary common battery system where the lamp is maintained lighted by current flowing through the circuit
15 controlled by the receiver hook until it has been cut out by the insertion of the plug.

Figure 1 is a diagram showing a system embodying the present invention, in which the calling and supervisory signals, together with the controlling devices,
20 are operated by a source of current at the office, while the talking current is supplied by local batteries not shown; Figs. 2 and 2^a are details illustrating a practical method of momentarily controlling circuits through the operation of the gravity switch; Fig. 3 is a further
25 detail showing the construction of the electro-magnets, by which the supervisory signals are operated; Fig. 4 is a diagram showing the invention applied to a common battery system in which the source of current at central is utilized for all purposes; and Fig. 5 a dia-
30 gram showing a modification, in the winding of the electro-magnets which control the supervisory signals in the central energy system.

Referring to Fig. 1, the stations A, B, and C are shown as arranged along a common line having the
35 conductors 1 and 2, each station having an ordinary telephone instrument, and a controlling device adapted to control the signal and the use of the telephone, the said controlling devices being indicated conventionally as electro-magnetic coils D.

The construction and operation of the controlling devices will not be herein described, since these devices may be operated by any suitable means under the control of said electro-magnetic coils. These controlling devices are adapted to be operated in response
45 to an impulse of current in the right direction, to lock out all instruments except the one calling or called, the impulse of current in the case of the calling subscriber's line being controlled by the gravity switch E, which causes the line 2 to be momentarily connected
50 with the ground when the receiver is taken down, thus closing a circuit which flows from the battery F through conductors 3 and 4 to the line wire 1, and thence through all the coils D to the line wire 2, and thence to the ground and back to the battery F, the other terminal
55 of which is grounded as shown. This operates all the controllers along the line, so that no other subscriber on the same line can connect in his telephone. At the same time, a circuit is momentarily closed from the battery through the conductors 3, 4, and 5, the magnet 6, con-
60 ductor 7 and line wire 2, to the ground and back to the battery, thus energizing the said magnet 6, and causing the calling drop 6^a to fall, thus notifying the operator at central of a call, and, at the same time, breaking the circuit from the battery at 4^a, so that any further

manipulation of the receiver will have no further effect
65 on the controlling devices along the same line.

Upon receiving the call, the operator at the central office inserts the answering plug *a* into the spring jack *b*, and, by means of the listening-in key *c*, connects in
70 her telephone *c*² and ascertains what number the subscriber desires. The talking current in the system shown in Fig. 1 is supplied by local batteries not herein shown. Upon ascertaining the number required, the operator inserts the calling plug *d* in the spring jack of
75 the line required, and then secures control of the proper instrument on that line to the exclusion of the others by manipulating the selecting key *e* the proper number of times, the manipulation of the said key *e* closing a circuit as follows: Battery F, conductor 3, conductor
8, conductor 9, conductor 10^a, electro-magnet 10^b,
80 conductor 12, and conductor 13 to the tip strand, thence out over the line through all the controlling devices, and back to the sleeve strand, which is connected with the ground through the key *e*, thus completing the circuit back to the battery.

It will be seen that the first impulse of current which follows the manipulation of the key *e* will energize the electromagnet 10^b, thus causing the armature 10^c to move from the position shown in the drawing, and close a circuit through the terminals 10^d and 10^e,
90 which circuit includes the lamp 10^f and is completed through a ground connection.

When the called subscriber answers, the taking down of his receiver momentarily connects the sleeve conductor of his line, which corresponds to the con-
95 ductor 2 of the calling line, with the ground, thus completing the circuit as follows: Battery F, conductors 3, 8, 9, 10^a, coil 10^b, conductor 14, conductor 15, conductor 16 to the sleeve terminal, which is connected with the main line wire which has been grounded by
100 removing the receiver, thus momentarily completing the circuit. This energizes the electro-magnet 10^b, so that the armature 10^c is moved to the position shown in the drawing, extinguishing the lamp 10^f. This notifies central office that a connection has been made,
105 and that the subscriber has answered, the lamp belonging to the calling line not being lighted at all until conversation is finished, since the operator has already communicated with the calling subscriber and knows that he is on the line. After both lines have been
110 connected, and both receivers taken down, the supervisory lamps are then under control of the switch-hook, and each adapted to be lighted in response to the hanging up of its receiver, which temporarily grounds the line wire 1 as indicated. Each lamp, however, is
115 wholly under the control of the switch-hook on the line to which it belongs, there being no direct connection between the two lines, since the cord circuit is in two parts, and connected inductively by a repeating coil for the transmission of the talking current.

The circuit controlled by replacing the receiver upon the hook is as follows: Battery F, conductors 3, 8, 9, and 10^a, coil 10^b, conductor 12, conductor 17 to the tip strand which is connected with the conductor 1, which as stated is momentarily grounded as the receiver is
125 being hung up so as to complete the circuit back to the battery. This energizes the magnet 10^b, and causes the lamp 10^f to be lighted, so that as soon as the

operator sees both of the lamps lighted she understands that conversation has been finished, and that the two lines may be disconnected. Before disconnecting the lines, however, the operator manipulates the restoring key *f*, which completes a circuit including the conductors 3, 8, 9, and 10^A, the coil 10^B, and conductor 14 which is connected by the key *f* with the sleeve strand and the wire 2, and thence back through the wire 1 to the tip strand which is connected with the ground by the key *f* to complete the circuit. This sends an impulse of current through all the instruments on both lines in the direction opposite to that which has been employed to set the controllers, such impulse of current serving to restore the several controllers as described in my prior patent above cited. Since the coil 10^B is included in said circuit, the light 10^C will be extinguished. The restoring key *f* includes both lines, so that both lamps are extinguished upon the manipulation of this key. For convenience in illustration, two keys *f* are shown, but in practice a single key would be employed with the connections arranged to include both lines.

A practical device for temporarily closing the circuits controlled by the receiver hook is shown in Fig. 2, the said receiver hook *E* being shown as provided with an insulated projection *E*², which is adapted to engage an offset inclined projection *h*², which is connected with a contact arm *h* permanently connected with the ground. As the receiver is taken down, and the hook *E* rises, the projection *E*², engaging the projection *h*², will move the contact piece *h* to the right into contact with a terminal *i*, which is connected with the line wire 2, so that the said line wire is momentarily connected with the ground, the contact member *h* returning to its normal intermediate position as soon as the receiver hook has passed beyond the projection *h*². When the receiver is hung up, producing the downward movement of the hook *E*, the projection *E*² will act on the other surface of the projection *h*² pressing the contact piece *h* to the left into contact with the terminal *i*², which is connected with the line wire 1, thus momentarily connecting that line wire with the ground. The contact piece *h* may be in the form of a spring, so that it will normally stand in the position shown, while the relation of the projection *E*² to the projection *h*² is such that the two are disengaged when the receiver is in either of its normal positions.

In connection with the coils 10^B and 10^C, the more direct circuits which produce the operation of the lamps have alone been traced, there being, however, in each case a more indirect circuit which passes through the inactive coil, such circuit, however, containing the several controllers and being of so much higher resistance than the direct circuit as practically to shunt the said inactive coil. The more indirect circuit above referred to may be traced as follows:—Battery *F*, conductors 3, 8, 9, coil 10^B, conductors 14, 15, 16, sleeve terminal, line wire 2, controlling devices *D* in multiple, to the line wire 1, and thence to ground, thus completing this circuit of comparatively high resistance. In order, however, to further counteract the effect of the current in the inactive coil, a novel arrangement is employed and illustrated in Fig. 3. The cores of the two coils are connected together by

an iron frame 10^E extending along the coils, and affording a support for the armature 10^F. The armature is pivoted directly upon the iron frame 10^E, and is in metallic contact therewith so that it constitutes a magnetic conductor leading from the pole of the coil in which the current predominates back through the frame, thus producing a short circuit for the magnetic flux which is thereby diverted from the opposite pole which carries the coil having the lesser magnetic energy, thereby still further decreasing the magnetic effect produced by said coil upon the armature.

One of the objects of the present invention is to adapt the party line controlling system, described in my prior patent above referred to, to the central energy system, in which the current for talking is supplied from a source at the central office. Ordinarily in this system the terminals of the source of current at central are continually connected with the conductors of the line, the current being prevented from flowing by means of a condenser at each station which is short circuited when the receiver is taken down. In the system described in my prior patent, however, the controlling devices are permanently bridged across the line at the several stations, in order that they may all be affected by a current flowing over a circuit which is under the control of instrumentalities at any station on the line. If, therefore, the terminals of the source at central were permanently connected with the main conductors, there would be a continual waste of current which is undesirable. Furthermore, in order that the talking current may not affect the controllers when two lines are connected, they are adjusted to respond only to current of greater strength than that of the talking current, and the system is provided with means for causing such current of greater strength to flow through the controller at the proper time. In accordance with this invention, therefore, the controlling devices and the signaling device at central office are operated by current flowing through a circuit including one of the line conductors and a third conductor such as a ground, and the said circuit includes some additional battery cells, and means for momentarily closing it. A practical arrangement for accomplishing these ends is illustrated in Fig. 4. The receiver hook is arranged, as previously described in connection with Fig. 1, so as momentarily to connect the line wire 2 with the ground when the receiver is taken down, and the line wire 1 with the ground when the receiver is hung up, (the connection being made only as the receiver hook travels from one position to the other, and not being maintained when the receiver is either on or off the hook,) the taking down of the receiver thus momentarily closing a circuit from the battery *F* through the conductor 8, the additional battery cells *F*², the conductors 3, 4, 5, and coil 6 to the line wire 1, and through the several controllers *D* to the line wire 2, which is momentarily grounded, the circuit thus momentarily being completed through the ground *G* at the central office. This causes the armature 6^a to be attracted, closing a circuit through the conductors 3, 4, 5, coil 6, conductor 6^b, armature 6^a and conductor 6^c through the lamp 6^d, and thence back to the battery through the ground connections *G*² and *G*. This local circuit remains closed until the operator inserts the answering plug *a* into the answering jack, so that the sig-

nal lamp is kept lighted until the operator has placed herself in communication with the subscriber. This local signal circuit also short circuits the line and the controllers located thereon, so that any further manipulation of the switch hook at the calling station will have no influence on the controllers. Upon receiving the signal, the operator inserts the answering plug *a* in the calling subscriber's jack, and this closes a local circuit as follows: from sleeve of plug to cell F^3 (which may be part of main battery, but is shown separately for clearness), conductor 70, coil 4^b , conductor 7^a , back to sleeve. The coil 4^b is thus energized and opens the switch 4^a , not only putting out the calling signal lamp, but also cutting out all circuits having a ground connection. So far as relates to the calling subscriber, the connection is now complete, there being no operation of the supervisory signal belonging to his line at this period. The instrument on the line called for is then selected, after the calling plug *d* has been inserted in the proper jack, by means of the selecting key *e* substantially as previously described in connection with Fig. 1. The main battery *F* is then connected with the line through the conductors 16 and 17, and 16^a and 17^a , one set of conductors belonging to one line, and the other set to the other, and both containing repeating coils for the transmission of the talking current. The circuit which operates the controllers, however, includes the additional battery cells F^2 , so as to carry sufficient current to operate the controllers which are of sufficient resistance not to respond to the talking current. The circuit for the controllers is substantially the same as that previously described in connection with the calling line, except that it is closed by the selecting key *e* instead of by the subscriber's switch-hook. Said circuit may be traced as follows: main battery *F*, conductor 8, additional cells F^2 , conductors 3, 4^e , selecting key *e*, tip terminal to line wire 1, controllers in multiple to line wire 2, sleeve terminal, selecting key *e*, conductor 17^b to ground. The selecting key is operated the right number of times to select the desired station by the impulses of current on the circuit above described, which station is then signaled in the usual way. The supervisory signals are operated in this system substantially as previously described in connection with the local battery system, it being necessary, however, that the coils which control the lamps should be in circuit with the line conductors when the telephones are in use. In order, therefore, that these coils may not be affected in such a way as to change the positions of the armatures by the talking current, both coils are included in the talking circuit, so that the energizing effect of the current on each of the coils will be substantially the same so as not to affect the position of the armature.

The talking circuit may be traced, as follows: battery *F*, conductor 9, coil 10^b , conductor 12, repeating coil, conductor 17, tip terminal, line 1, telephone, line 2, sleeve terminal, conductor 16, repeating coil, conductor 12^a , coil 10^b , conductor 9^a , to opposite terminal of battery *F*. The coils 10^b and 10^b thus receive substantially the same energization, and the armature 10^c is not affected.

To secure the operation of the said armature by a preponderance of current in one coil or the other, a

third circuit, which may conveniently be a grounded circuit, is utilized as previously described, the portion *F* of the battery being shown as having its ground connection substantially in the middle, so that a grounded connection will complete the circuit only through half the battery at a time.

The circuit to energize the coil 10^b and light the called subscriber's signal lamp before the called subscriber answers is controlled by the selecting-key *e*, and includes the conductor 9, the coil 10^b , the conductor 12, and the conductor 17, the said conductor 17 being connected through a conductor 17^b with the ground when the key *e* is operated. This affords a direct circuit through the coil 10^b including substantially half of the portion *F* of the battery while the coil 10^b is practically short circuited, and not materially affected by the current. This lights the called subscriber's lamp as soon as the selecting key has been operated, the lamp being extinguished when the subscriber takes down his receiver to answer. The circuit for the coil 10^b which puts out the lamp starts from the other side of the battery *F*, and passes through conductors 9^a and 12^a , the conductor 16 to the sleeve strand which is connected with the line that is grounded when the receiver is taken down, thus completing a direct low resistance circuit through the coil 10^b , short-circuiting the coil 10^b . Both of the lamps are lighted after conversation has been finished by the movements of their respective switch-hooks as previously described, and extinguished by the restoring key *f*, which closes a circuit through the coil 10^b corresponding to both lines, the said circuit being completed by means of the conductor 18, which grounds the conductors 16 and 16^a when the key *f* is operated.

The circuit through the controllers, which is closed by the key *f*, includes the additional battery cells F^2 , the said circuit being as follows: battery *F*, conductor 8, cells F^2 , conductors 3, 4^e , 19, switch *f*, sleeve, line wire 2, controllers in multiple, line wire 1, tip, switch *f*, to ground and back to battery through ground *G*. This circuit is the same on both lines, and when closed the current restores all the controllers to normal, as well as both supervisory signals.

It is to be noted that the main circuit, which includes the whole of portion *F* of the source of current at central office, is broken at the time when the circuits for energizing the magnets 10^b or 10^b are closed, the energizing of the former to light the lamp taking place before the subscriber has removed his receiver to complete the talking circuit over his line, while the energizing of the latter magnet takes place as the subscriber hangs up his receiver, the first movement of the hook breaking the talking circuit, while the supplemental circuit through half of the battery *F* is closed during the continued movement of the receiver to its normal position.

In the modification shown in Fig. 5, an arrangement is illustrated whereby the movement of the armature which controls the supervisory signal lamp depends upon polarity instead of strength, this being accomplished by winding each conductor of the circuit around both of the magnet coils 10^b and 10^b , but in opposite directions. The armature 10^c is polarized as by a permanent magnet 100, near which the said

armature is pivoted in the middle, and the cores of the magnets are connected together by means of a yoke 101. Each coil, therefore, tends, when energized by current, to make one of the cores north, and the other core south in polarity, the other coil, however, having the opposite tendency, so that when a substantially equal amount of current is flowing through both coils the effect upon the cores will be neutralized, so that there will be no tendency to move the armature 10^a.

10 If, on the contrary, a preponderance of current is flowing through one set of coils the neutralizing effect will no longer be present, so that both cores will become oppositely polarized causing the armature to be moved in one direction or the other as the case may be.

15 For the purpose of clearly indicating the instrumentalities referred to, the terms "wire conductor" and "ground conductor" have been used in some of the claims, with the understanding, of course, that any practical conducting connection may be substituted without departing from the invention. Furthermore, it is not intended to limit the invention to the specific arrangement chosen for purposes of description and illustration, since modification may obviously be made without departing from the invention.

25 Claims.

1. The combination with controlling devices bridged across the line at the several stations, of a source of current at the central office adapted to be connected with the line terminals when two stations are connected for conversation, a supplemental source of current connected with one line terminal only, a third conductor, and means for controlling a circuit including the line conductors, the controlling devices, the third conductor and the supplemental source of current.

35 2. The combination with controlling devices bridged across the line at the several stations, of a source of current at central office, a cord-circuit for connecting the terminals of said source with the line terminals, a wire conductor leading from one terminal of said source to one of the line conductors, a supplemental source of current in series with said wire conductor, a ground conductor leading from the other terminal of the said supplemental source to the several stations, means located at each station for momentarily connecting the other line conductor with the ground conductor, and means for disconnecting the wire conductor from the line in response to the insertion of the cord-circuit plug in its jack.

45 3. The combination with controlling devices bridged across the line at the several stations, of a source of current at central office adapted to be connected with the line terminals when two stations are connected for conversation, a third conductor connected with said source midway between the line terminals, means for connecting either line with said third conductor, and a signal controlled by current flowing in either circuit thus closed.

55 4. The combination with the main line conductors, of a source of current at the central office, means for connecting the terminals of said source with the line terminals, a third conductor connected with said source midway between the line terminals, means located at the subscriber's station for momentarily connecting either line with said third conductor, and a signal controlled by current flowing in either circuit thus closed.

65 5. The combination with the controlling devices bridged across the line at the several stations, of a source of current at the central office adapted to be connected with the line terminals to supply current for conversation, a supplemental source of current, a signaling device, a third conductor, and means located at each station for momentarily closing a circuit including the line conductors, the controlling devices, the third conductor, the supplemental source of current, and the signaling device, as set forth.

6. The combination with the two line conductors, of a

third conductor, means located at each subscriber's station for momentarily connecting either line conductor with said third conductor in response to the movement of the receiver hook, a calling signal located at central office included in circuit with one line conductor and said third conductor, and a clearing out signal included in circuit with the other line conductor and said third conductor. 75

7. The combination with the two line conductors, of a third conductor, means located at each subscriber's station for momentarily connecting either line conductor with said third conductor, a calling signal located at central office and controlling devices located at the several stations, said calling signal and said controlling devices being included in circuit with one line conductor and said third conductor, and a clearing out signal included in circuit with the other line conductor and said third conductor. 80

8. The combination with two supervisory signals located at central office and corresponding respectively with the calling and called subscriber's lines, of controlling devices along the called subscriber's line, means located at central for operating said controlling devices and the supervisory signal corresponding to the called subscriber's line, means under control of the called subscriber for restoring the supervisory signal when the call is answered, means under control of each subscriber for operating the supervisory signal corresponding to its own line when conversation is finished, and means located at central for restoring the controlling devices and signals when the lines are disconnected. 85

9. The combination with the line conductors, of a third conductor, an electro-magnet in a circuit including one of said line conductors and said third conductor, a second electro-magnet in a circuit including the other of said line conductors and said third conductor; a signal controlled by both of said magnets, and means for separately controlling said circuits. 90

10. The combination with two lines and the line conductors thereof; of a cord-circuit having conductors for closing the circuits of said lines respectively without connecting said lines; induction coils for transmitting the variable transmitter controlled current from one line to the other; a third conductor leading to each line; means located at the substation for momentarily closing a circuit including one or the other of the line conductors, said third conductor and one member of said cord circuit; and separate signals controlled by current in the circuits thus closed. 105

11. The combination with the line conductors; of a third conductor; a source of current; a circuit including both lines and said third conductor; controlling devices included in said circuit; a circuit including one line and said third conductor; a supervisory signal located at the central station and included in the circuit last named; means for momentarily closing the circuit first named when a receiver is taken down; and means for momentarily closing the circuit last named when a receiver is hung up. 110

12. In a supervisory signal system for telephones, a signal corresponding to each line; an electro-magnetic device for operating said signal provided with two coils; a circuit for said device including one of said coils to cause one operation of said signal; means located at central office for controlling said circuit; a circuit including the other of said coils to cause a different operation of said signal; and means located at a substation for controlling said latter circuit. 115

13. The combination with the main conductors of a telephone line; of a source of current and two oppositely wound coils in circuit with each line conductor; two cores each having wound thereon one of the coils of each line; a polarized armature; a signal controlled by said armature; a third conductor; and means for momentarily closing a circuit including one of said line conductors, the coils thereof, and said third conductor. 120

14. In a party line telephone system, a controlling device at each station; a circuit including all the controlling devices of one line; an electro-magnetic coil included in said circuit; means located at the central office for closing said circuit; a second circuit including another electro- 125

magnetic coil; means located at each substation for closing said second circuit; and a signal operated by current flowing through one of said coils and restored by current flowing through the other.

- 5 15. In a party line telephone system, a controlling device at each station; a circuit including all the controlling devices of one line; an electro-magnetic coil included in said circuit; means located at the central office for closing said circuit; a second circuit including another electro-magnetic coil; means located at each substation for closing said second circuit; a signal operated by current flow-
- 10

ing through one of said coils and restored by current flowing through the other; a third circuit including the controlling devices and one of said coils; and means located at the central office for closing said third circuit.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK E. MAYBERRY.

Witnesses:

NANCY P. FORD,

HENRY J. LIVERMORE.