No. 885,270. PATENTED APR. 21, 1908.

F. E. MAYBERRY & N. H. HOLLAND.

TELEPHONE SYSTEM.

APPLICATION FILED APR. 12, 1902.

3 SHEETS—SHEET 1.

Fig. 1.

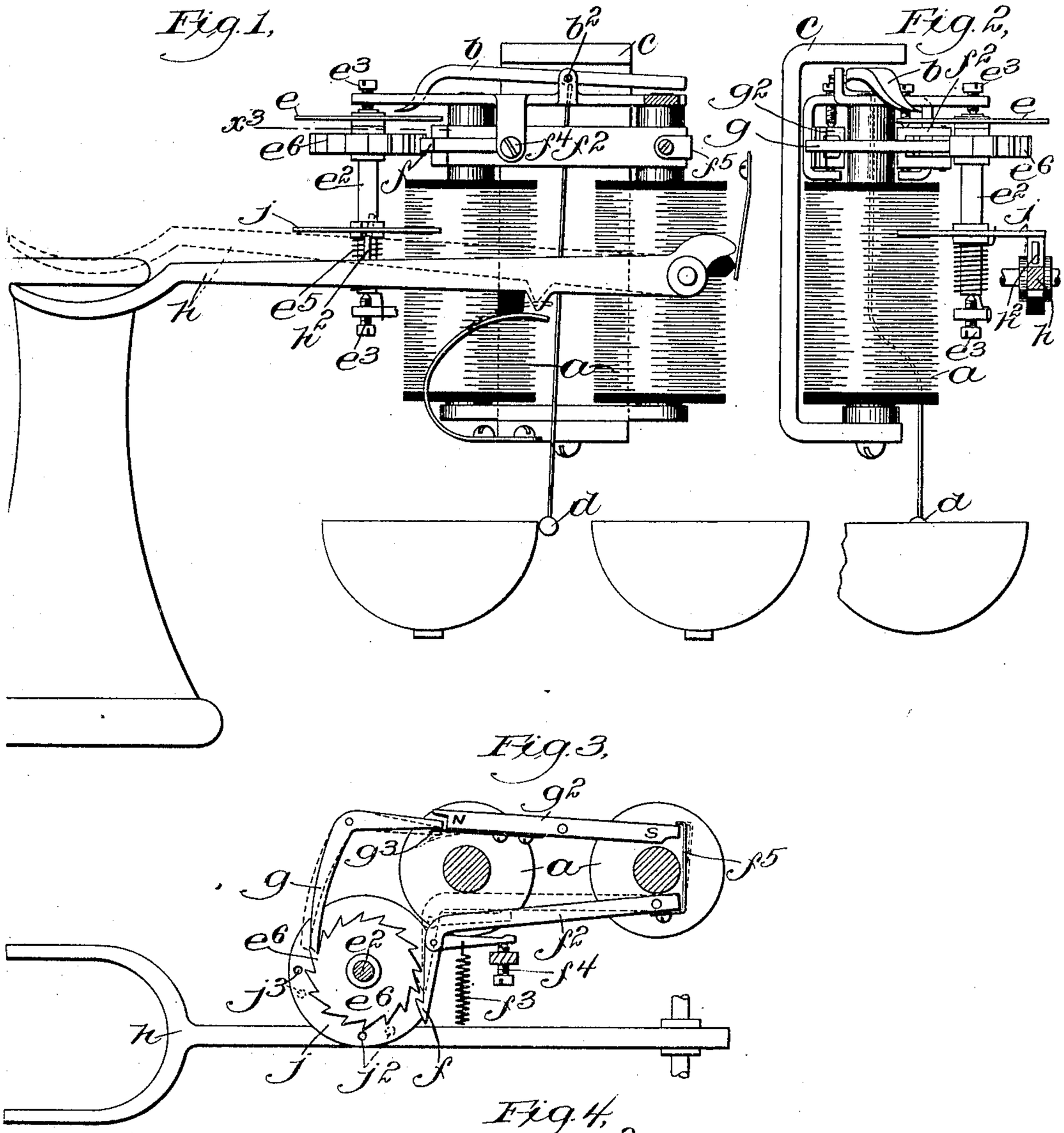
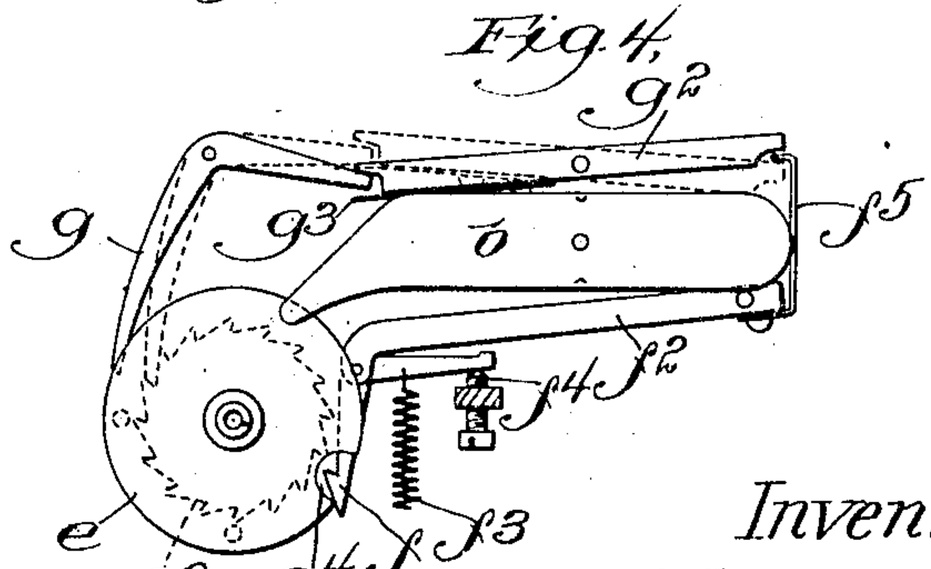


Fig. 2.

Fig. 3.

Fig. 4.



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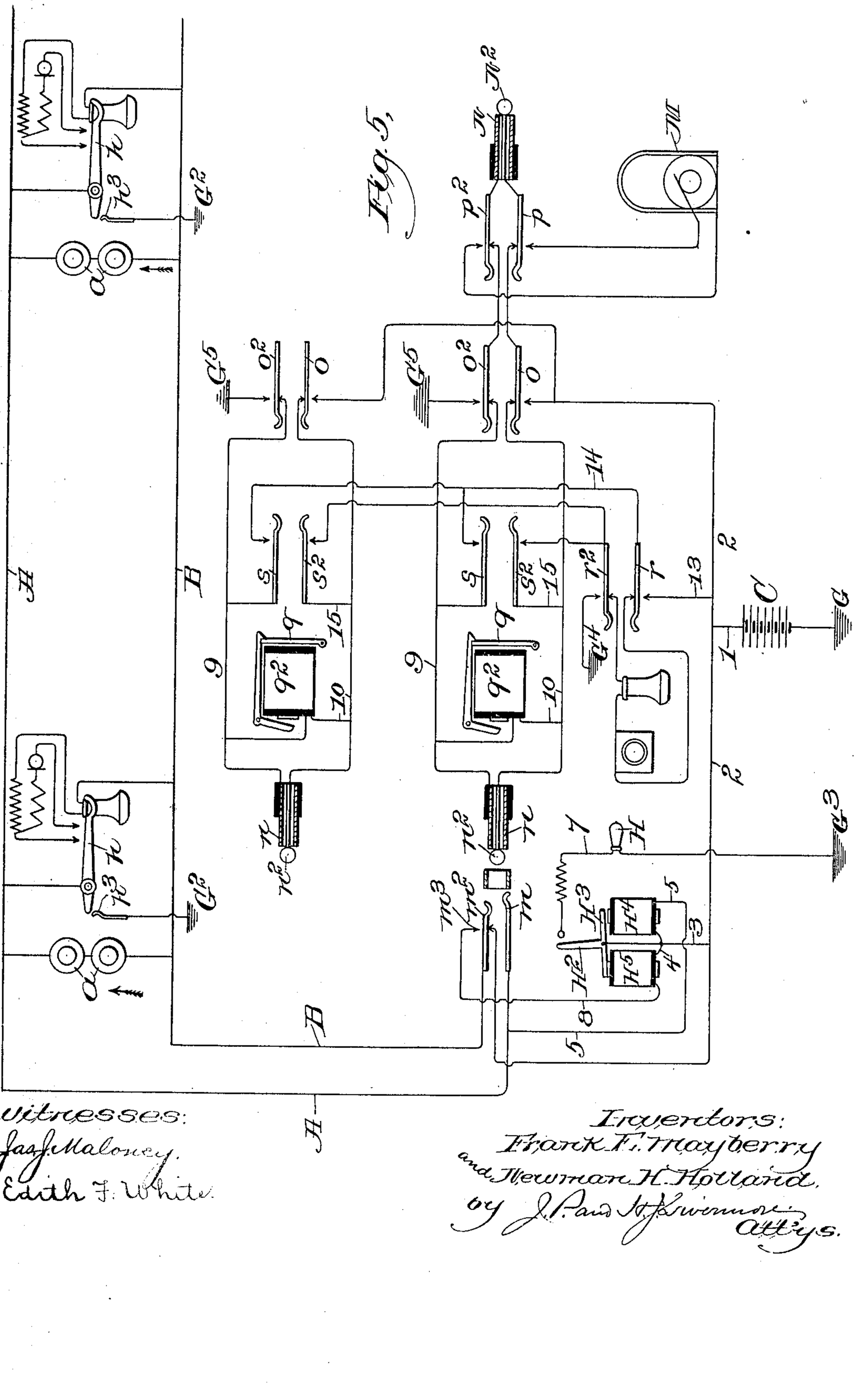
3 SHEETS—SHEET 2.

Fig. 5.



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TELEPHONE SYSTEM.

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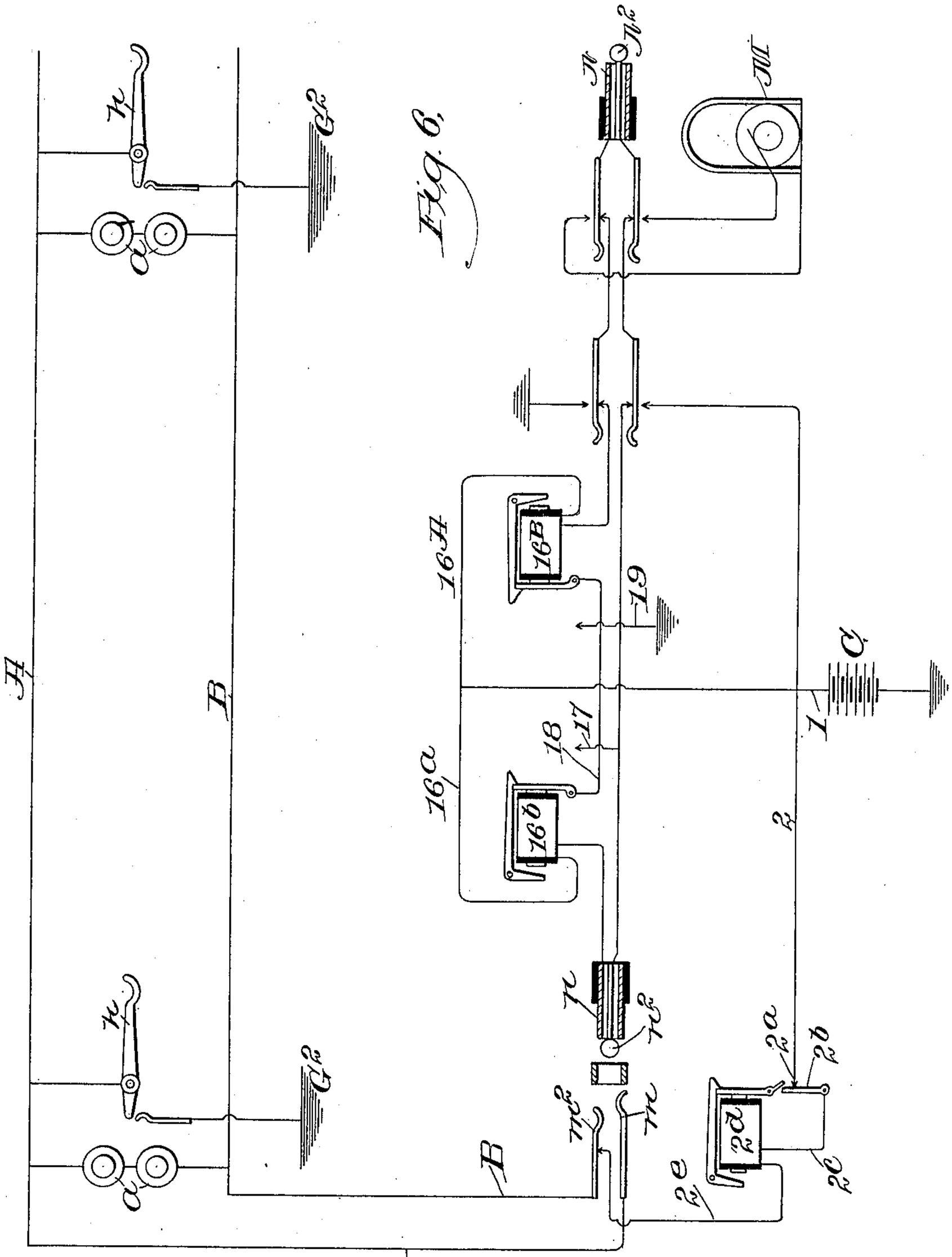
3 SHEETS—SHEET 3.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

No. 885,270. Specification of Letters Patent. Patented April 21, 1908.

Application filed April 12, 1902. Serial No. 102,561.

To all whom it may concern:

Be it known that we, FRANK E. MAYBERRY and NEWMAN H. HOLLAND, of West Medford, county of Middlesex, and State of Massachusetts, and Brookline, county of Norfolk, and State of Massachusetts, respectively, 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 signaling system for party lines and is embodied in a system in which each instrument is provided with a selecting device arranged to be operated and restored by current from a source located at the central office, each station being provided with a selecting or controlling instrument adapted to be set by a certain definite number of impulses of current in one direction and restored by an impulse of current in the opposite direction.

The system to which the invention relates is shown and described in Patent No. 691,281, granted to Frank E. Mayberry Jan. 14, 1902, and the present invention relates mainly to improvements in the local instrument and also in the devices located at the central office for utilizing the selecting devices.

In accordance with the invention, the instruments located at the several stations are each arranged to be operated by a single electro-magnet having two coils, the same magnet also being utilized to operate the signal, the selecting mechanism being controlled by current from a source of current at the central office, while the signal may be given by a bell striker operated in the usual way by an alternating current flowing through the same magnet coils. The electro-magnet at each instrument is provided for this purpose with two armatures, in addition to the usual signaling or bell striker armature; and the said armatures are respectively adapted to control an operating pawl and a retaining pawl, the mechanism being provided with a restoring spring which is adapted to restore the parts to normal position when the retaining pawl has been released.

The bell striker or equivalent signaling device is mechanically controlled by means of the selecting mechanism, so that, although influenced by current from a central office source, it is incapable of effectual operation unless the selecting mechanism has previously been placed in the proper position to permit the operation of the signaling device. The same selecting mechanism is likewise arranged to control the closure of the telephone circuit at each station, so that when the line is in use it is impossible for any subscriber except the one at the station where the telephone is in use to connect his local telephone circuit with the line.

The invention further relates to a novel arrangement for signaling central office and for automatically locking out the other telephones along the line on which the signal has been originated, a third conductor being utilized for this purpose which may conveniently be a ground, since it is totally disconnected from the line when the telephones are in use.

A further feature of the invention consists in means for restoring the several controlling instruments to normal in response to a device under the control of the operator, such as the ordinary switch hook, which is operated by hanging up the receiver, and it is desirable and practicable, though not essential, to arrange the system so that the instruments will not be restored until both receivers have been hung up; so that if a subscriber should inadvertently hang up his receiver before he had finished his conversation, he would still maintain control of the line unless the party with whose station he was connected should also hang up his receiver.

Figure 1 is a front elevation of one of the instruments located at a station; Fig. 2 is a side elevation of the same; Fig. 3 is a horizontal section on line x^3 of Fig. 1; Fig. 4 a partial plan view; Fig. 5 a diagram of circuits at the central office illustrating a signaling mechanism of novel construction and arrangement; and Fig. 6 a diagram showing line and central office connections by means of which the restoring of the instruments on two connected lines is dependent upon the hanging up of the receivers.

In the telephone system embodying the present invention, each station along the line is provided with an instrument arranged to be controlled from central office, the several instruments along a line being operated by

impulses of current sent from a source at central office, a certain number of impulses in one direction serving to place one instrument on a line in condition to receive a signal and in condition to close its telephone circuit, the other instruments along the said line being operated by these impulses of current in such a way as to prevent a signal from being received or the telephone circuit from being closed. The several instruments are arranged so as to be restored to normal along the line by an impulse of current in the opposite direction.

In accordance with the present invention the instrument located at the sub-station is provided with an electro-magnet having two coils *a* bridged across the line, as shown in Figs. 5 and 6, and the magnet commonly utilized to operate a bell striker may be employed for the purpose. As herein shown, the magnet coils *a* are provided with a polarized armature *b* pivoted at b^2, and provided with a bell striker *d*, the said armature being polarized by the influence of a permanent magnet *c*. Thus an alternating current traveling over the line (the magnet coils *a* being permanently bridged across the line) will tend to set the armature *b* and the bell striker *d* in vibration to give a signal.

In order to prevent the operation of the signal, however, at all stations along a given line except the one selected, the bell striker is provided with a mechanical stop *e* which is herein shown as a disk mounted on a shaft e^2 supported by bearings e^3 so as to be capable of rotation. The said disk *e* is so related to the armature *b* which is connected with the bell striker *d* as to engage the said armature, so that the movement of the said armature is prevented under normal conditions. To permit the movement of the armature, however, each disk is provided with a notch or opening e^4, Fig. 4, the disks at the several stations having the notches differently placed, so that if the said disks are rotated in unison at all the stations until the notch in the disk at one station is in line with the armature *b* at said station, so as to permit the vibration of the said armature, the notches in the disks at all the other stations will be out of line with the respective armatures at said stations so as to prevent the operation of the signal at any of said stations.

As herein shown, the locking disk is located between the limits of movement of the vibrating armature *b*, so that it will prevent the movement thereof whether the projecting portion of the armature is above or below the disk, it being, therefore, immaterial in which position the said armature may stop after a signal has been rung in.

The several disks along a given line are arranged to be operated in unison, by a step by step movement in response to impulses of current in a given direction flowing over the line from central office through the electro-magnets at the several stations, the said electro-magnets being bridged across the line, as stated. Thus a certain definite number of impulses rotating the disks *e* at all the stations will bring the notch e^4 in the disk at the right station in position to permit the vibration of the armature *b*, so that when current of the proper character is subsequently sent over the line the signal will be given only at the selected station, since the armatures at the other stations are prevented from vibrating in response to the action of the current.

To restore the several disks *e* to normal, each disk is provided with a restoring device such as a motor spring e^5, and is acted upon by a retaining pawl which pawl is adapted to be released or disengaged from the teeth of the ratchet wheel e^6 connected with the disk *e* in response to an impulse of current flowing over the line through the electro-magnet coils *a* in the opposite direction from that utilized in propelling the disks in their forward direction against the stress of the springs. The propelling pawl *f* and the retaining pawl *g* are controlled respectively by armatures f^2 and g^2, and in order to obtain the proper action in response to impulses of current differing in direction or polarity, at least one of the said armatures is polarized, it being unnecessary, however, to polarize both, as will be explained.

As herein shown, the armature g^2 which operates the releasing pawl *g* is polarized, it being practicable to locate the said armature, as shown, in proximity to the permanent magnet *c* which is used to polarize the armature *b*, so that only one permanent magnet, and that the one usually employed in connection with a magneto bell, need be used.

The polarity of the armature g^2 is such that when an impulse of current flowing in the right direction to propel the disks *e* forward, passes over the line, the said armature, which is pivoted between the two coils *a*, will be rocked on its pivot to the position shown in Fig. 3, thus moving the pawl *g* into engagement with the teeth of the ratchet wheel e^6. The same impulse of current will attract the armature f^2, causing the pawl *f* to engage with a tooth of the ratchet wheel e^6 moving the same one step, as indicated in dotted lines Fig. 3.

The armature g^2 is provided with a spring or yielding connecting device g^3 to permit the retaining pawl *g* to ride over the ratchet teeth as indicated when the said armature is in the position shown in Fig. 3. It is obvious that this action will take place each time an impulse of current in the right direction is sent over the line, so that all the disks will be forwarded an equal distance so as to permit the operation of the signaling device at one instrument only in response to the signaling current.

The armature g^2 is balanced on its pivot, and its movement is prevented when uninfluenced by current on account of its proximity to one of the poles of the magnet a, so that the retaining pawl g remains in engagement with a tooth of the ratchet wheel e^6 until it has been released after the subscriber has finished using the instrument.

The releasing of the device is accomplished under the influence of an impulse of current sent over the line in the opposite direction, which will reverse the polarity of the electromagnet coils a so as to move the armature g^2 to the position shown in full lines Fig. 4. While this same impulse of current will attract the armature f^2 it will not prevent the disk from being released, since the said armature f^2 is provided with a restoring spring f^3, so that as soon as the current ceases, the said armature will be retracted or moved to the full line position, Figs. 3 and 4, the pawl f being pivotally connected with the said armature and arranged to be engaged by a stop f^4 which throws it out of the path of the ratchet teeth. The armature g^2 will, as stated before, remain in either position, and consequently will hold the retaining pawl g out of engagement with the teeth of the ratchet wheel e^6, permitting the disk e to return to its normal position through the agency of the spring or equivalent device e^5. The normal position of each disk is controlled by a suitable stop.

In order to prevent the release of the several disks in response to the action of the signaling current which passes through the magnet coils a and which might influence the armature g^2, the armature f^2 is provided with a locking device f^5 adapted to engage the end of the armature g^2 when the armature f^2 is retracted, and thereby hold the same in the position shown in Fig. 3.

The armature f^2 being non-polarized and also provided with the restoring spring f^3, will not respond to the signaling current, but will remain in its retracted position, and will prevent the movement of the armature g^2. The said armature f^2, however, as stated, will respond to the impulse of current used for restoring, and will consequently unlock the armature g^2 and permit the same to move to the position shown in Fig. 4.

To prevent the use of the telephone at any excluded station on the line, each controlling device is arranged to coöperate with the switch hook h or equivalent device which closes the telephone circuit, so that the said switch hook will not move even if the receiver is taken down. For this purpose a stop j is arranged to coöperate with the switch hook h, the said stop being shown as a disk similar to the disk e, and mounted on the shaft e^2 in proximity to the switch hook h. Each disk j is provided with two openings j^2 and j^3, the opening j^2 normally standing in line with a projection h^2 from the switch hook so as to receive the said projection if the receiver is removed and permit the said switch hook to be raised. If, however, the disk has been moved from its normal position it is obvious that the opening j^2 will be moved out of alinement with the projection h^2 so that the face of the disk will engage the said projection h^2 and prevent the switch hook h from rising. The openings j^3 are differently located so as to correspond with the different locations of the notches or openings e^4, so that when the notch e^4 is in such position that a signal can be received, the opening j^3 at the same instrument will be over the projection h^2, so that the telephone circuit can be closed. If, therefore, a subscriber desires to call up central office he can take down his receiver and connect in his telephone, since the switch hook h will rise because the opening j^2 is in the proper place, and if he has received a call from central he can use his telephone because the opening j^3 has been placed in the proper position prior to the receiving of the calling signal.

While the instrument herein-before described is intended for use with a local battery system, the magnetos at the sub-stations may be dispensed with, and the calling signal displayed at central in response to the act of the subscriber in closing the telephone circuit, as by taking down the receiver. In addition to the signaling at central, moreover, the taking down of the receiver causes an impulse of current to travel over the line, on which the station is located, in the proper direction to move the several instruments one step forward so that each instrument is locked out, it being impossible, therefore, for the subscriber at any other station to connect his instrument with the line. The calling instrument, however, is not affected by this impulse of current, since the projection h^2 is arranged to engage the opening j^2 before the impulse of current travels over the line, so that the disk at the calling station is mechanically prevented from rotating.

Referring to Fig. 5 which shows one arrangement whereby the desired results are attained, the source of current used for operating the several selecting instruments is shown as a battery C located at the central office, one terminal of said battery being connected with the ground, as indicated at G, while the other terminal is adapted to be connected with one of the line conductors, the other line conductor being arranged to be grounded. It may be noted in this connection that the ground constitutes a third conductor, which might of course be metallic if desired. The ground connection, however, answers every purpose, and is not objectionable since it is totally disconnected from the regular line conductors at all the sub-stations when the telephones are in use.

The receiver hook h is arranged to make a passing contact at h^3 when it is moved in either direction by taking down or hanging up the receiver, with a ground connection G^2, so that when the said receiver hook is moved, the line conductor A will be temporarily grounded, establishing a circuit from the battery C through conductors 1 and 2 to jack terminal m^2, and line wire B, and thence through all the selecting instruments (represented as the coils a) which are bridged across the line in multiple, to the conductor A and thence to ground at G^2, the current traveling through the several instruments in the direction indicated by the arrow which is the right direction to operate the pawl f. Thus, when the receiver is taken down at any station the disks e at all the other stations on the same line are given one forward movement so as to lock out all the telephone instruments along said line. The same battery C is utilized to operate a signal at the central office such as a lamp H, the lighting of which is controlled by a switch member H^2 connected with an armature H^3 pivotally supported between the poles of two electromagnets H^4 and H^5 so as to be moved in one direction or the other if either of the said coils is energized. The armature H^3 is shown in normal position in Fig. 5.

The grounding of the line A, which has been described, also temporarily closes a circuit from the battery C through conductors 1, 2, 3 and 4, to the coil H^4, conductor 5, to line A and back to ground at G^2. This causes the armature H^3 to be attracted by the coil H^4, thus closing a circuit from the battery through conductor 1, 2, 3, switch member H^2 and conductor 7, (the latter containing the lamp H) to ground at G^3. This notifies central of the call and the answering plug n, n^2 is then inserted in the jack m, m^2, thus disconnecting the direct path from battery C to line B at contact m^2, so that any further movement of the receiver will have no effect on the several instruments. After two lines have been connected by the subsequent insertion of the calling plug N, N^2 into the jack of the line called for, the proper station on the said line is selected by the necessary number of impulses sent over the line by the operator at central office.

The means for sending out the necessary number of impulses to select the station on the line called are herein indicated in diagram as consisting of two table keys o, o^2 and p, p^2, the former controlling the impulses of battery current and the latter controlling the signaling impulse from the magneto M.

The principle involved is substantially the same as that shown and described in the prior patent to F. E. Mayberry herein-before cited, and does not form any part of the present invention, being merely included in the illustration for the purpose of insuring a clear understanding of the invention involved in the present application. The operation is as follows. The operator will press the table key o, o^2, a number of times corresponding to the number of impulses required to select the calling station, the contact o^2 grounding at G^5 the sleeve terminal N, which corresponds to the conductor A of the line on which the called station is located, while the contact o will connect the tip terminal N^2 and the conductor B of the same line with the battery. This will cause an impulse of current to flow over the said line corresponding in direction to the impulse of current already described in connection with the calling line, and indicated by the arrow, and the operation of the key the right number of times will thus result in the selection of the desired station. The subsequent manipulation of the table key p, p^2 will then connect the magneto with the line on which the called station is located so as to give the necessary signal. It is to be understood that this method of calling is illustrated herein merely to afford a proper understanding of the present invention, a more practical method of accomplishing this purpose being shown and described in another application filed herewith.

The clearing out signal q is controlled by a magnet q^2 which is energized when the receiver is hung up by current in a circuit completed by grounding the line A momentarily. The circuit is as follows: Battery C, conductors 1, 2, 3, 4, and 8 (including magnet coil H^5) to jack terminal m^2, which when the plug is inserted is in contact with the terminal m^3, conductor 9 to magnet q^2, conductor 10 to sleeve terminal, which connects with line A, which, as has been stated, is momentarily grounded by the hook when the receiver is hung up. This does not, however, extinguish the signal lamp H, since there is another more direct circuit through conductor 5 and line A to ground, which includes the magnet coils H^4, the said coils H^4, therefore, being energized to a greater extent than the coils H^5, which, as shown above, are in series with the clearing out magnet q^2.

Upon receiving the clearing out signal the operator restores the instruments on both lines to normal by sending a current from the battery C over the lines through all the coils a in the direction opposite to that indicated by the arrow. This is accomplished by means of a table key r, r^2 which grounds the line wire B at G^4 and connects the line conductor A with the battery through the conductors 13, 2 and 1.

In order that the system may be installed at the central office without materially changing the existing circuits, the table key r, r^2 is placed in the circuit of the operator's set, as shown, and is adapted to be connected into any of the cord circuits through the agency of the ordinary listening-in key with which

each cord circuit is provided, the said listening-in key being indicated by the reference letters s, s^2. It becomes necessary, therefore, only to add the table key r, r^2 in connection with the operator's set, as indicated, so that one only of such restoring keys is sufficient for a complete operator's position, since it can be connected with any cord circuit through the existing listening-in key belonging to said cord circuit.

Upon receiving the clearing out signal, therefore, the operator will press the listening-in key as is customary, and upon finding that the subscribers have finished their conversation she will operate the restoring key r, r^2, thus sending an impulse of current over both lines in the right direction to restore the instruments.

The restoring circuit may be traced as follows: Battery C, conductors 1, 2 and 13, switch terminal r, conductor 14, switch terminal s, line conductor A, thence through the several instruments in the direction opposite to that indicated by the arrow to the line conductor B, tip terminals m^2 and n^2, conductors 10 and 15, switch terminal s^2, switch terminal r^2 to ground G^4. The restoring key r, r^2 also controls the signal lamp H by completing a circuit through the electro-magnet H^5 as follows: Battery C, conductors 1, 2, 3, 4, coil H^4, conductor 8, terminals m^3, m^2, tip terminal n^2, conductors 10 and 15, switch terminal s^2, switch terminal r^2 to ground G^4. There is another path for the current from the battery through the magnet coil H^4 and the conductor 5 to the line A, and thence through the several instruments to the line B and back to ground as above traced, it being obvious, however, that since this path includes the instruments along the line it will be of much higher resistance than that of the direct path through the electro-magnet H^5, so that the latter will attract the armature H^3 and break the lamp circuit through the conductor 7. Since the signal lamp H will not be put out until the restoring key r, r^2 has been operated, the said lamp serves as a reminder to the operator and tends to avoid the possibility of neglect in restoring the several instruments to normal after conversation has been finished.

A further feature of the invention is embodied in means for automatically restoring the instruments to normal without the intervention of the operator at central office. A diagram illustrating this feature is shown in Fig. 6, and for purposes of illustration a system somewhat analogous to a double supervisory system has been chosen, with the understanding, however, that the invention is not limited to such a system, since it is obvious that substantially the same restoring means may be applied to the lines separately.

As illustrated in Fig. 6, the circuit closed by the momentary grounding the line A as the switch hook passes the contact before a plug has been inserted in the jack at central causes the instruments on the same line to be locked out and a signal to be operated at central as previously described. This circuit is as follows: Battery C, conductors 1, 2 to switch terminals 2^a and 2^b, conductor 2^c, calling signal magnet 2^d, conductor 2^e, tip terminal m^2 line B and through the several instruments along the said line to the line A, and to ground G^2, the circuit being momentarily closed as the switch h passes the grounded contact. This locks out the instruments along the calling line, and operates the calling signal, the said calling signal or drop being so arranged as to break the circuit at 2^a and 2^b, as indicated, so that any further movement of the receiver hook prior to the restoring of the drop or the insertion of the plug at the central office will have no further effect on the instruments along the line. After the plugs are in, the hanging up of the receiver at either station will operate a clearing out drop, there being, however, a clearing out drop for each of two connected lines, while the circuit for current through the instruments in the opposite direction for restoring them is not completed until both clearing out drops have been operated. The hanging up of a receiver, for example, on the line illustrated will close a circuit as follows: Battery C, conductor 1, conductor 16^a, clearing out drop magnet 16^b, sleeve terminal, n, line A, to ground G^2, thus operating the clearing out drop belonging to that line.

The clearing out drop operates as a circuit closer to connect a conductor 17 leading from the tip wire, with a conductor 18, which is adapted to be connected with the ground through conductor 19, through the agency of the clearing out drop controlled by the electro-magnet 16^B, which belongs to the other line, and which is operated through conductor 16^A, etc., when the receiver on that line is hung up.

It is obvious, therefore, that the tip conductor will not be grounded until both clearing out drops have been operated, indicating that both receivers have been hung up and the conversation finished. Assuming that both clearing out drops have been operated, the circuit thus closed is from battery C, conductor 1, conductors 16^a and 16^A to both of the sleeve terminals, thence to both lines A through the several instruments to the lines B, thus restoring all the instruments to normal, thence to the tip terminals and the tip conductor which is connected with the ground through the conductors 17, 18 and 19.

While the construction and arrangement herein shown and described constitute a thoroughly practical embodiment of the invention, it is not intended to limit the invention to the specific construction and ar-

rangement shown, since it is obvious that material modifications may be made without departing from the invention.

Claims.

1. In a signaling system, an electro-magnet provided with a polarized armature and a signaling device operated by the vibration of said armature; means for preventing the vibration of said armature; a second armature in the field of said electro-magnet adapted by its movement to operate the means for preventing the vibration of the polarized armature; a third armature to control the restoring of the preventing means to normal; and means for energizing said electro-magnet by direct currents and by alternating currents, substantially as described.

2. In a signaling system, the combination with an electro-magnet provided with a polarized armature adapted to operate a signaling device; of a non-polarized armature adapted to respond only to the action of a direct current through said electro-magnet; a locking device for controlling the polarized armature adapted to be operated by the movement of said non-polarized armature; a second polarized armature; a restoring device controlled by said second polarized armature; means for preventing the said second polarized armature from responding to an alternating current; and means for energizing said electro-magnet by current in either direction or by an alternating current, substantially as and for the purpose described.

3. In a party line telephone system, an electro-magnet bridged across the line at each station thereon; means located at central office for energizing said electro-magnet by impulses of direct current in either direction; a controlling device adapted to be operated by the magnetic influence of said electro-magnet in response to impulses of current in one direction; a restoring device for the same operating in response to an impulse of current in the other direction; a vibrating armature controlled by said controlling device and adapted when not prevented by said controlling device to be vibrated by an alternating current passing through said electro-magnet; and means located at central office for sending an alternating current over the line, as set forth.

4. In a party line telephone system, a telephone circuit including a number of stations; a signaling device at each station; a locking device to prevent the closure of the said circuit at a station; a locking device to prevent the operation of the signaling device at a station; a single electro-magnet bridged across the line and provided with an armature for operating said locking devices and an armature for operating said signaling device; means for sending impulses of direct current through said electro-magnet from the central office to cause the operation of said locking devices; and means for sending an alternating current through said electro-magnet from central office to operate the signaling device, as set forth.

5. In a party line telephone system, the combination with an electro-magnet bridged across the line at each station; of a source of direct current located at central office; means for connecting the said source of direct current with the line conductors whereby the several electro-magnets are energized; means for reversing the direction of the current from said source; a source of alternating current; means for connecting the line conductors with said source of alternating current; armatures in the field of said electro-magnet and arranged respectively to respond to currents sent over the line of different direction; and a separate armature responsive to alternating currents for signaling, as described.

6. In a signaling device for party line telephones, an electro-magnet bridged across the line at each station; a non-polarized armature under the influence of said electro-magnet; a controlling device adapted to be operated by said non-polarized armature; a polarized armature also under the influence of said electro-magnet; a restoring device controlled by said polarized armature; means connected with the non-polarized armature for locking said polarized armature in a predetermined position; a second polarized armature connected with a signaling device; and means for connecting the line conductors with a source of alternating current to influence the said second polarized armature, as set forth.

7. The combination with the coils *a*, of the polarized armature *b* provided with the bell striker *d*, the locking disk *e*, the non-polarized armature f^2 adapted to operate said locking disk, the polarized armature g^2 for restoring said locking disk; means connected with the armature f^2 for locking said polarized armature g^2; a source of direct currents; a source of alternating currents; means for connecting the line conductors with either terminal of the source of direct current; and means for connecting the line conductors with a source of alternating currents, as set forth.

8. In a party line telephone system, a mechanical device located at each station for controlling both the telephone and the signaling device at said station; an electro-magnet bridged across the line at each station; an armature under the influence of said electro-magnet for operating said mechanical device; a separate armature for operating the signaling device, both of said armatures being in the magnetic field of said electro-magnet; means for energizing said electro-magnet by direct currents in either direction to operate said mechanical device; and means for ener-

gizing the same electro-magnet by an alternating current to operate the signaling device.

9. In a party line telephone system, a plurality of stations on one line; an electro-magnet at each station; a polarized signaling armature in the field of said electro-magnet; a locking stop to engage mechanically either side of said armature and prevent the same from vibrating, except when said stop is in a predetermined position, such predetermined positions differing respectively at the several stations; and means located at the central office for moving said stops in unison, as set forth.

10. In a party line telephone system, the combination with a plurality of stations, of the switch hook at each station; a telephone circuit leading to the several stations; a separate circuit controlled by each of said switch hooks, said circuit including all the stations on the same line; and a device located at each station and operated in response to the current flowing through the separate circuit above named for preventing the movement of the switch hook at said station, as set forth.

11. In a party line telephone system, a central station; a plurality of stations on a single line; a telephone at each station; a telephone circuit; means located at each station for closing the telephone circuit; a source of current located at the central office; a separate circuit therefor adapted to be momentarily closed by the means for closing the telephone circuit aforesaid; and devices operated by current flowing over said separate circuit for preventing the other telephones on the same line from being connected with central office.

12. In a party line telephone system, a signaling circuit at each station; a signaling device operated by a vibrating armature in response to current flowing through said circuit; means for mechanically engaging either side of said armature to prevent the signaling device from operating in response to such current; and devices located at the central office for operating the engaging means.

13. In a party line telephone system, a telephone line circuit having a plurality of stations; a switch hook at each station; a separate circuit including all the stations and adapted to be momentarily closed by the movement of said switch hook to send an impulse of current to each station; and a device located at each station under the influence of current flowing through said separate circuit for preventing the closure of the telephone circuit at the station where said device is located.

14. In a party line telephone system, the combination with the two conductors of the line circuit; of a third conductor; a series of controllers operated by electro-magnets; means for operating said controllers by current flowing in one direction; means for restoring said controllers by current flowing in the opposite direction; means for energizing said electro-magnets by current flowing over a circuit including said third conductor; a cord circuit at the central office; and means depending upon the insertion of the cord circuit plug at central for controlling the direction of current.

15. In a party line telephone system, the combination with the two conductors of the line circuit; of a third conductor extending from central office to the several stations; a series of electro-magnets bridged across the two conductors of the line circuit; controllers operated by said electro-magnets; a source of current one terminal of which is connected to said third conductor; and means for connecting the said third conductor with one of the line conductors and the other line conductor to the other terminal of said source of current to energize said electro-magnets, as set forth.

16. In a party line telephone system, the combination with the two conductors of the line circuit; of controlling magnets bridged across the line at each station; a source of current at the central office; a third conductor connected with one terminal of said source; and means for connecting one of the two conductors of the line circuit with said third conductor and the other conductor of the line circuit with the other terminal of the said source to energize the several electro-magnets, substantially as described.

17. In a party line telephone system, the combination with the two conductors of the line circuit; of an electro-magnet bridged across between the two conductors at each station; controlling devices operated by current flowing through said electro-magnets; a source of current located at central office and having one of its terminals normally connected with one of the line conductors and its other terminal grounded; and means for grounding the other line conductor to close a circuit through the several electro-magnets, as set forth.

18. In a party line telephone system, the combination with the two line conductors; of an electro-magnet for controlling purposes bridged across the line at each station; a source of current located at the central office; a third conductor such as a ground leading to the several stations from one terminal of the said source of current, the other terminal being normally connected with one of the line conductors; means located at each station for momentarily connecting the other line conductor with the other terminal of said source of current to close a circuit through the several electro-magnets; and a signaling device at central office, having a controlling electro-magnet located in the circuit thus momentarily closed, as set forth.

19. In a party line telephone system, the combination with the two line conductors; of an electro-magnet for controlling purposes bridged across the line at each station; a source of current located at the central office; a third conductor such as a ground leading to the several stations from one terminal of the said source of current, the other terminal being normally connected with one of the line conductors; means located at each station for momentarily connecting the other line conductor with the other terminal of said source of current to close a circuit through the several electro-magnets; a signaling device at central office having a controlling electro-magnet located in the circuit thus momentarily closed; and means operated by said signaling device for breaking the said circuit, as set forth.

20. In a party line telephone system, the combination with the controlling device at each instrument, and means for restoring said controlling device to normal in response to an impulse of current in a given direction; of a clearing-out signal for each line; a circuit controlling said clearing-out signal; means under control of the subscriber for closing the said circuit momentarily to actuate the clearing-out signal; and a circuit controlled by both clearing out signals of two connected lines, the closure of said circuit causing current to flow through the several controlling magnets in a direction to restore the controlling devices, as set forth.

21. In a party line telephone system, a controlling device at each station; a source of current at central office for operating the controlling device; a set of connecting cords at central office each provided with a circuit closer or table key; multiple circuits including the source of current and the controlling devices, each of said circuits being controlled by one of the circuit closers aforesaid; and a single circuit closer common to all of said multiple circuits.

22. In a party line telephone system, a controller at each station; a calling signal at central office; means for actuating the several controllers and said calling signal by an impulse of current in one direction; and means for restoring to normal said controllers and said calling signal by an impulse of current in the opposite direction.

23. In a party line telephone system, a controller at each station; a calling signal at central office; common means for actuating the several controllers and said calling signal; a clearing out signal at central office; means located at each station for operating the clearing out signal; and common restoring means located at central office for said controllers and said calling signal.

24. In a party-line telephone system, a controlling device bridged across the line at each station; means for operating said controlling device by current flowing in one direction and for restoring said controlling device by current flowing in the opposite direction; a source of current at the central office; means located at the central office for connecting either line conductor with either terminal of the source of current; a third conductor connected with one terminal of said source of current; and means located at each station for connecting one side of the line with said third conductor.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

FRANK E. MAYBERRY.
NEWMAN H. HOLLAND.

Witnesses:
NANCY P. FORD,
HENRY J. LIVERMORE.