No. 850,434. PATENTED APR. 16, 1907.

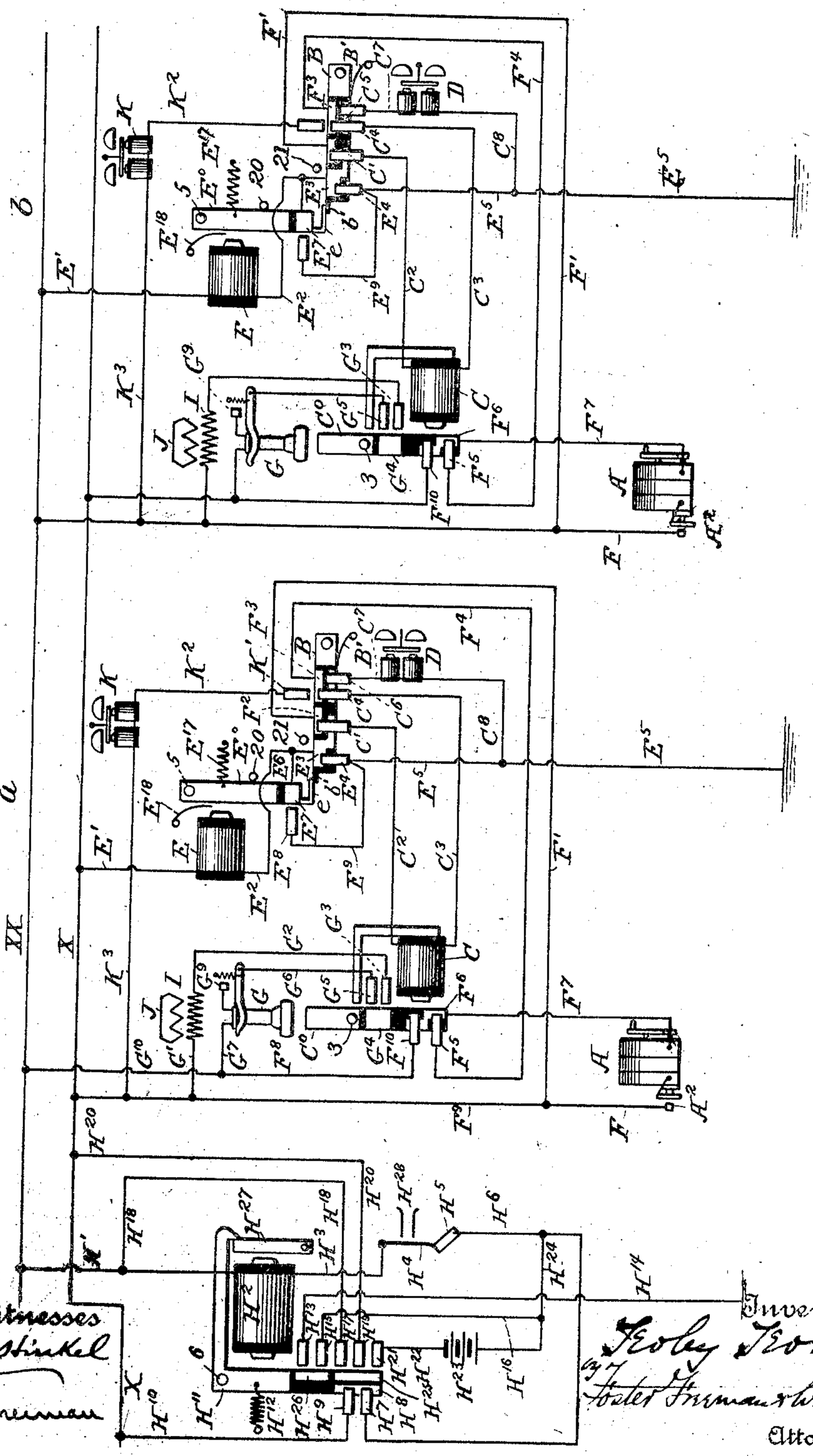
K. KOHN.

TELEPHONE APPARATUS.

APPLICATION FILED FEB. 11, 1904.

3 SHEETS—SHEET 1.

Fig. 1.



No. 850,434. PATENTED APR. 16, 1907.

K. KOHN.

TELEPHONE APPARATUS.

APPLICATION FILED FEB. 11, 1904.

3 SHEETS—SHEET 2.

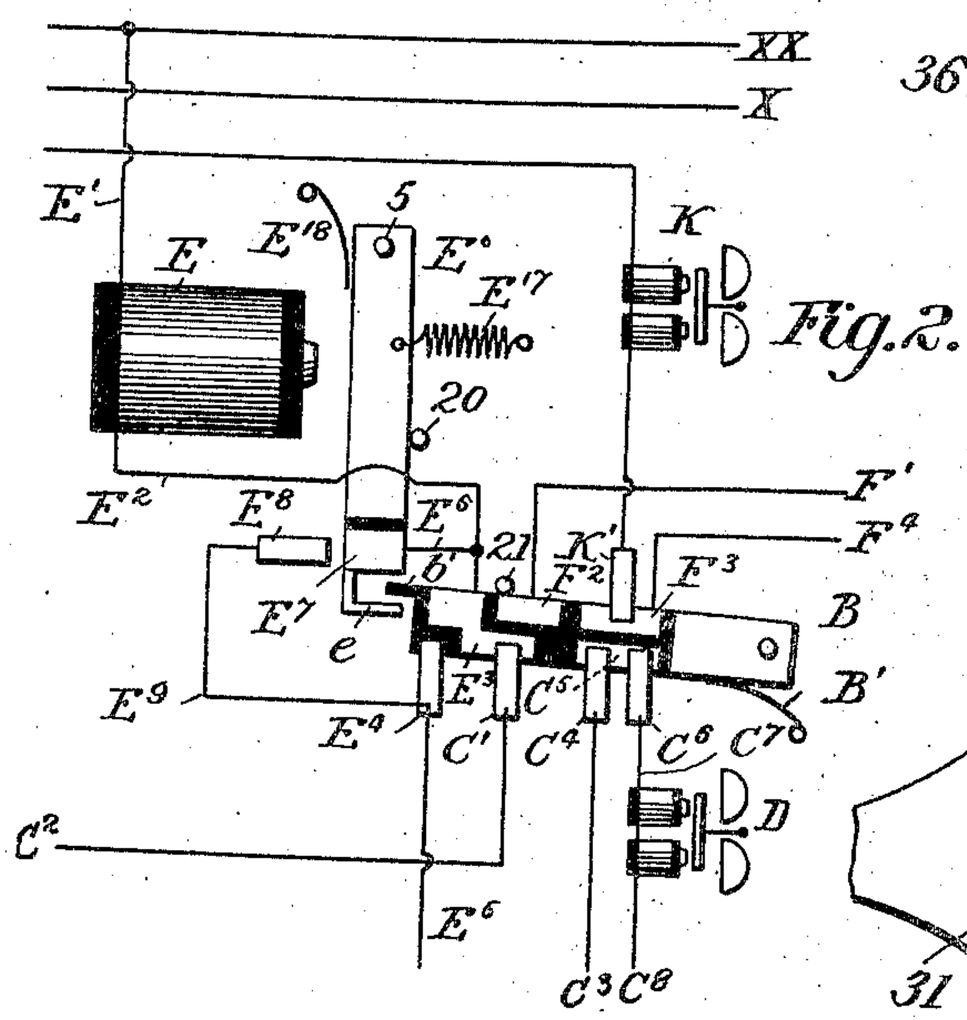


Fig. 2.

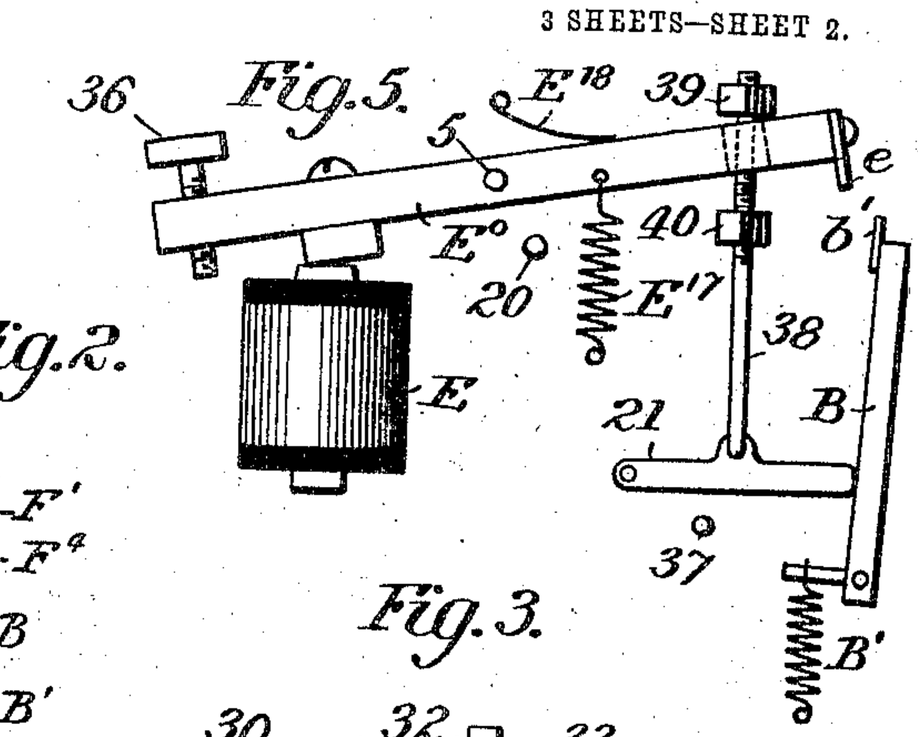


Fig. 3.

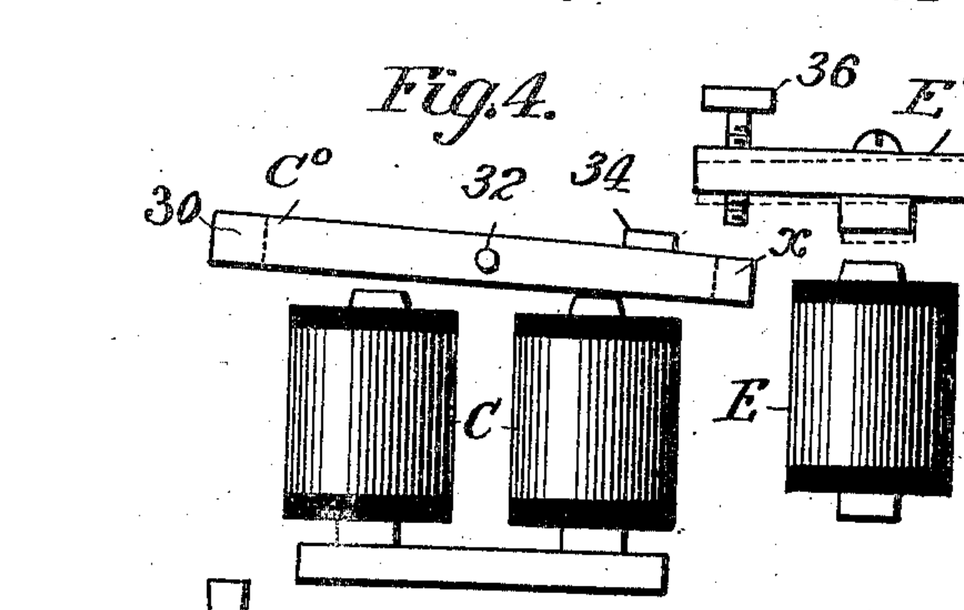


Fig. 4.

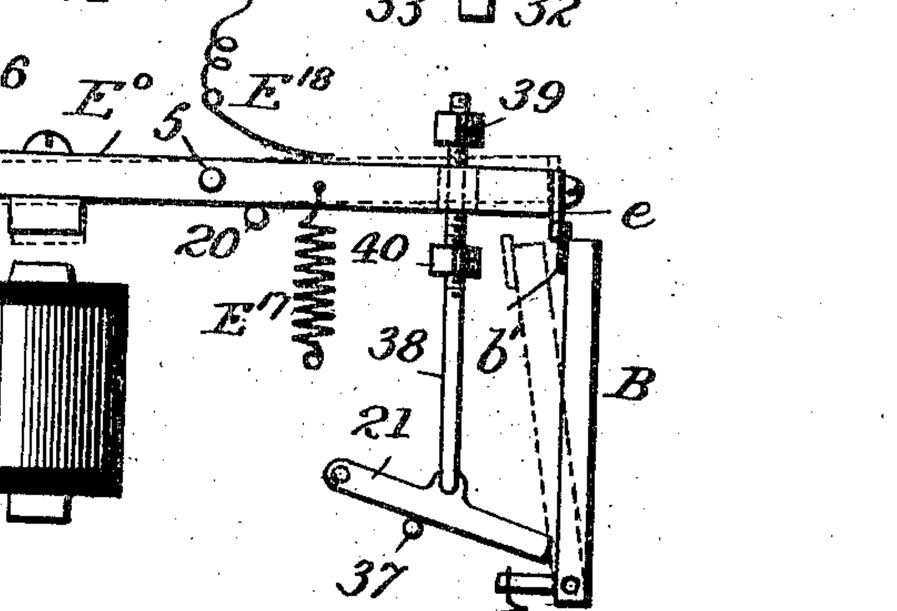


Fig. 5.

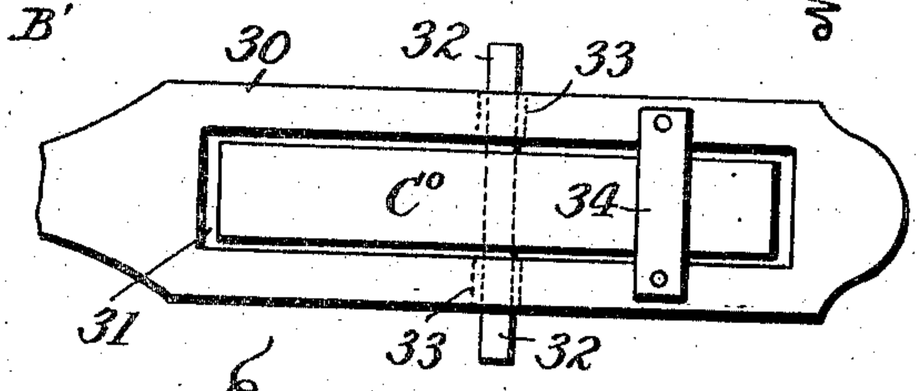
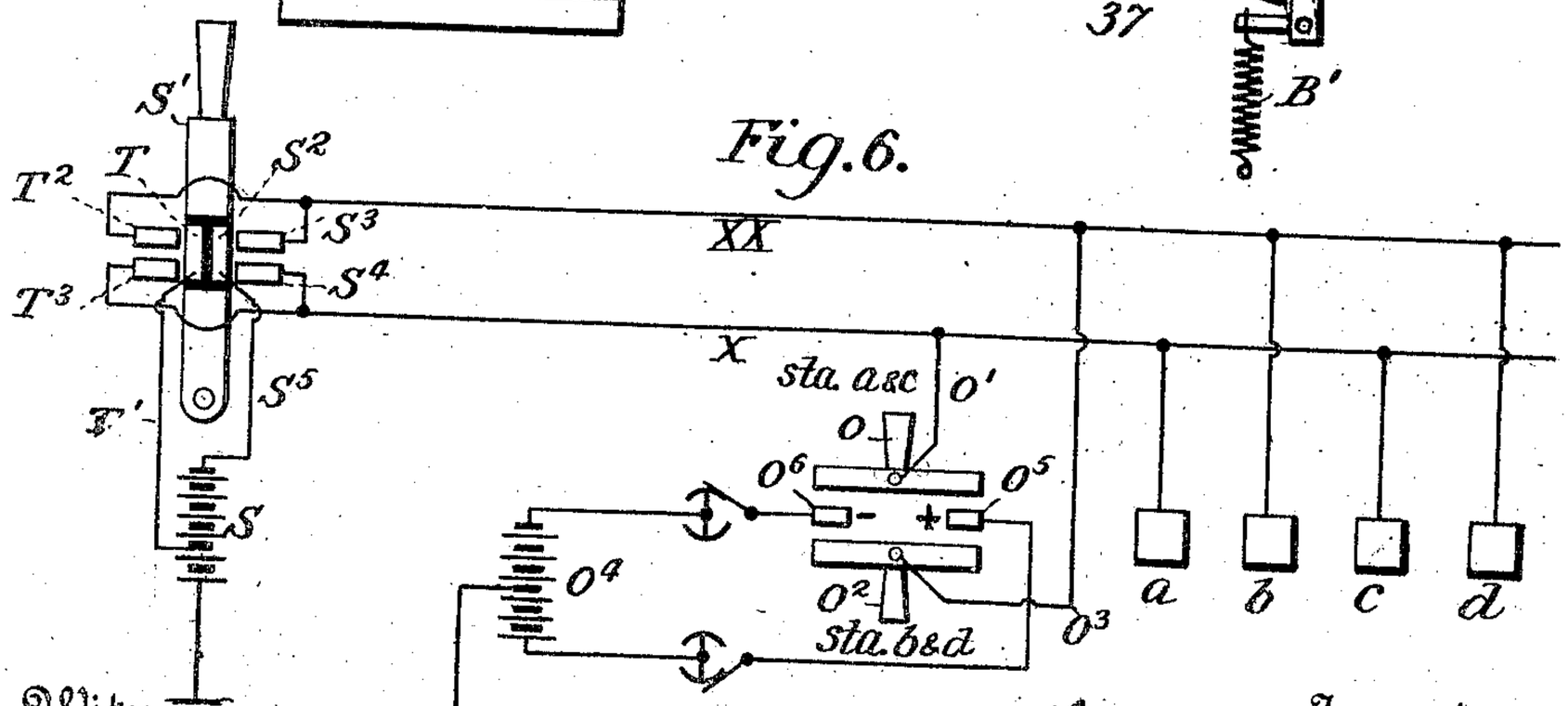


Fig. 6.



Witnesses
J. J. Stinkel
G. H. Freeman

Inventor
by Story Kohn
Foster Freeman & Watson
Attorneys

No. 850,434. PATENTED APR. 16, 1907.

K. KOHN.

TELEPHONE APPARATUS.

APPLICATION FILED FEB. 11, 1904.

3 SHEETS—SHEET 3.

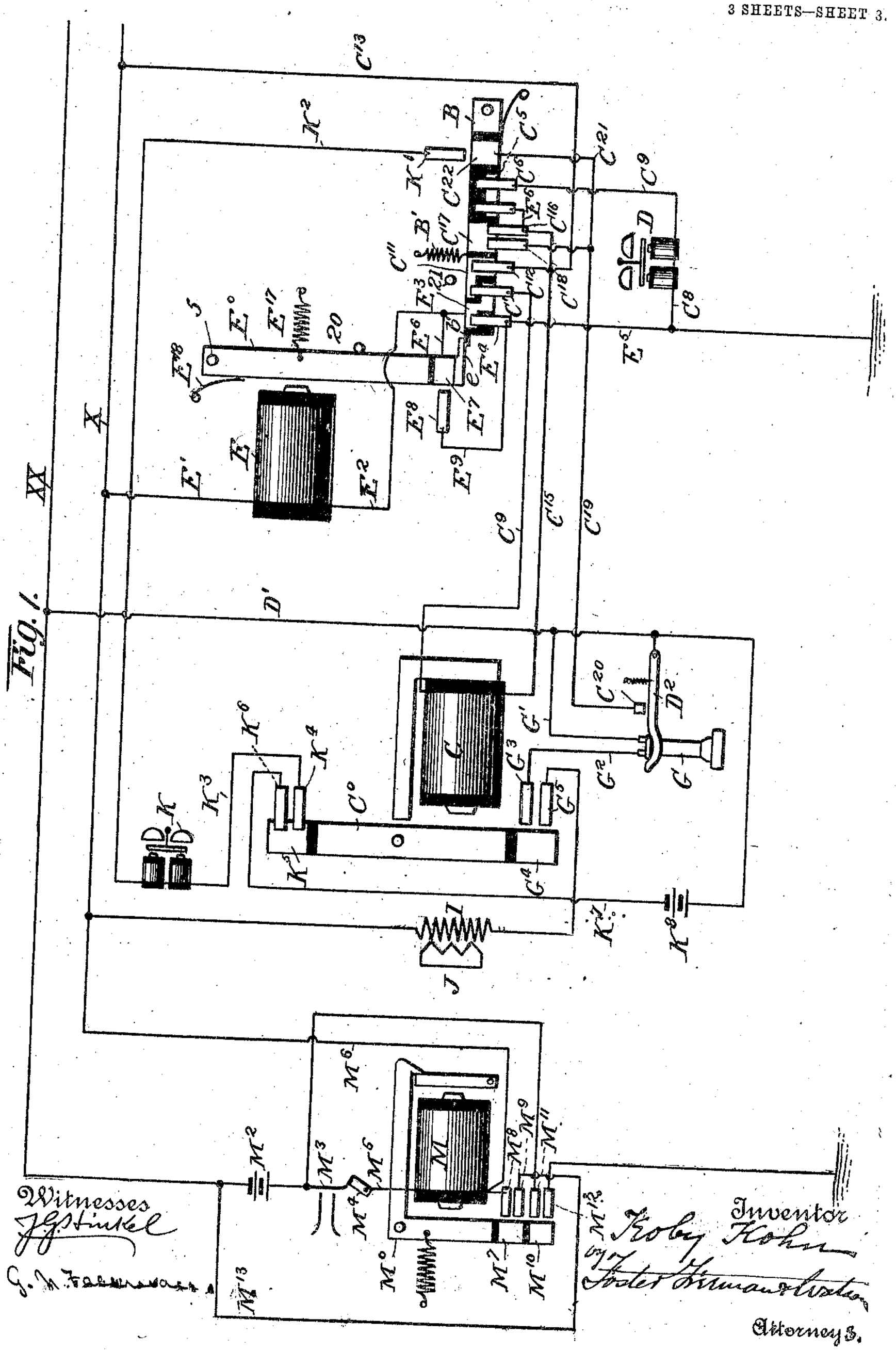


Fig. 1.

Witnesses
J. J. Finkel
E. H. Fahrenbach

Inventor
Kohn
by Foster Freeman Watson
Attorneys.

UNITED STATES PATENT OFFICE.

KOBY KOHN, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO LOUIS A. KSENSKY, OF DENVER, COLORADO.

TELEPHONE APPARATUS.

No. 850,434. Specification of Letters Patent. Patented April 16, 1907.

Application filed February 11, 1904. Serial No. 193,116.

To all whom it may concern:

Be it known that I, KOBY KOHN, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Telephone Apparatus, of which the following is a specification.

This invention relates to telephone systems; and the object of the invention is to provide simple and efficient means whereby when one subscriber on a party-line either calls central or receives a call from central all other subscribers on the party-line will be prevented from cutting in, thereby preventing any other subscriber on the line from overhearing the conversation or any part of it, and thus insuring absolute privacy on the line while in use.

One of the essential features of my invention is that all receivers on the party-line are in open circuits until a subscriber calls or is called, when his receiver-circuit will be closed and all other receiver-circuits on the line be prevented from being closed by the respective subscribers until the calling or called subscriber has finished the conversation and all parts on the party-line have been restored to normal position by an operator at central.

The invention, which may be used either with the local-generator system or the central-energy system for calling, will be fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view illustrating my invention as used in a system employing local generators for calling central. Fig. 2 is a diagrammatic view of a portion of the apparatus employed at each of the substations, showing the parts in á different position. Fig. 3 is a plan view of one of the armatures employed. Fig. 4 is a side elevation of the resetting devices. Fig. 5 is a similar view of a portion of Fig. 4, showing the parts in a different position. Fig. 6 is a diagrammatic view of devices for sending currents over the main-line wires by an operator at central. Fig. 7 is a diagrammatic view illustrating my invention as used in connection with the central-energy system.

It is to be understood that the invention may be embodied in an apparatus which may form an attachment to telephones at present in use or it may be a part of the telephone.

In Fig. 1 I have illustrated diagrammatically the devices employed at a central station and also those at two substations *a* and *b*. It is to be understood, however, that the invention may be used with four substations on the party-line, of which two will be connected to the line-wires X and X X, the same as substations *a*, and two the same as substation *b*.

A is a generator of any known style for sending out an alternating current, one of such generators being at each substation, and when not in use its armature is cut out at A^2, which may be considered its normal condition.

C is a polarized magnet, one being provided at each station, and it is immaterial what its polarity may be so far as concerns its energization by the generator A, because the current from the latter is alternating and will thus operate a magnet of either polarity. At substation *a*, the magnet C may be of the same polarity as that at substation *b;* but if four substations are on the party-line the magnets C at the other two stations will be of opposite polarity to those at stations *a* and *b*.

Referring now to Fig. 1, and assuming a subscriber desires to call central, the generator A is operated, and the circuit is closed at A^2, thereby establishing a circuit as follows: from generator A to wire F, wire F′, contact F^2, brush C′, wire C^2, magnet C, wire C^3, brush C^4, contact F^3, wire F^4, brush F^5, contact F^6, wire F^7 to the generator. This will energize the magnet C and attract its armature C^0, pivoted at 3, with the result that the generator-circuit will be broken through the magnet C at F^5 F^6. This is done to prevent the return of C^0, as the current being alternating and magnet C polarized such action would result were it not for this break in the circuit. The receiver-circuit will be closed at G^3, G^4, and G^5, and the brush F^{10} will be engaged with contact F^6. Current from the generator A will then pass to wire F, wire F^9, line-wire X to wire H^{30} at the central station, brush H^9, contact H^8, brush H^7, wire H^6, contacts H^5 and H^4, wire H^3, through magnet H^2, wire H′ to line-wire X X, to wire F^8, brush F^{10}, contact F^6, wire F^7 to generator A. This current will energize magnet H^2 and attract its armature H^{11}, which is pivoted at 6, and drop H^{27} will be released to notify central of the call. When the armature H^{11} is

attracted, the circuit from the generator at each substation on the line through the magnet H^2 will be broken at H^7, H^8, and H^9, and at the same time contact H^{26} will be engaged with brushes H^{13} and H^{15} and contact H^{25} with brushes H^{17}, H^{19}, and H^{21}.

At each substation there is a magnet E, the armature E^0 of which is pivoted at 5 and the movement of the armature E^0 is resisted by a comparatively weak spring E^{17} and also by a stronger spring E^{18}.

There is an arm B pivoted at one end, adjacent to the armature E^0, and its free end is provided with a finger b', adapted to engage a finger e on the free end of the armature E^0, and these fingers are normally held in contact with each other by a spring B', which normally tends to move the free end of the finger b' and which movement is resisted by the finger e when the armature E^0 is in its normal position, as shown in Fig. 1. A stop 20 limits the movement of the armature E^0 under the influence of its spring E^{17}, and a stop 21 will limit the movement of the arm B under the influence of its spring when the fingers e and b' have been disengaged. The arm B carries the contacts F^2 and F^3, already referred to, and also contacts E^3 and C^5.

Referring now to the central station, when the magnet H^2 has been operated by the generator-current, as already described, current from a battery H^{23} will be sent over the line-wires X X and X and through the magnets E at the respective substations, as follows: from battery H^{23} to wire H^{22}, brush H^{21}, contact H^{25}, brush H^{17}, wire H^{18}, wire H' to wire X X, or from contact H^{25} to brush H^{19}, wire H^{20} to wire X. From the wires X X and X, respectively, current will pass to wire E', magnet E, wire E^2, contact E^3, brush E^4, wire E^5 to the ground, thence to wire H^{14}, brush H^{13}, contact H^{26}, brush H^{15}, wire H^{16}, back to battery H^{23}. Part of the current passing over wire H^{18} will pass through magnet H^2, wire H^3, spring-contact H^4, contact H^5, wire H^{24} to battery, and thereby insure the attraction of the armature H^{11} after the current from th generator A has been cut out at H^7, H^8, and H^9 until the circuit through the magnet H^2 is broken at H^4 H^5, as will be referred to hereinafter. The current passing from the battery H^{23} over the wires X X and X will thus energize the magnet E at each of the substations on the line. This current, however, is of sufficient strength only to overcome the resistance of the spring E^{17} to the movement of the armature E^0, and the latter will move until it engages the spring E^{18}, which will stop its further movement. This movement, however, is sufficient to disengage the finger e from the finger b', and the arm B will then move under the influence of its spring B' until it is arrested by the stop 21, as shown in Fig. 2 of the drawings. This movement of the arm B will disengage contact E^3 from brush E^4, and the circuit through magnet E from the battery H^{23} will be broken at this point; but another circuit will be established through E, including magnets C and the bell D in series, as will be hereinafter described. The additional resistance of C and D—say about one thousand ohms each—will be too much to enable the weak current to energize E sufficiently to hold its armature against the action of spring E^{17}, and the armature E^0 will return to normal position, as shown in Fig. 2. As the movement of arm B is the same at all substations, it will be seen that the generator-circuit at each substation for its magnet C will be broken at C' and F^2 and at C^4 and F^3, and therefore no other subscriber on the line can close his receiver-circuit at G^3, G^4, and G^5 until after the parts are again restored to normal position, as will be explained hereinafter. A metallic circuit at the calling substation has, however, been established as follows: From line X X to wire G^{10}, to wire G^7, through receiver G to contact G^9, and, assuming the receiver has been removed from its hook, through the hook to wire G^6, brush G^5, contact G^4, brush G^3, wire G^2, wire G', wire F^9 to wire X, and the calling subscriber can thus talk with central and all the other subscribers, being unable to close their receiver-circuits, cannot hear any conversation that may be carried on. As shown, the receiver-circuits are each provided with the usual secondary of an induction-coil I in close proximity to the usual primary of an induction-coil J. When central answers the calling subscriber, a jack or plug is inserted at H^{28}, which will break the circuit from battery H^{23} at H^4 and H^5, thereby deënergizing the magnet H^2, which will release its armature, and the latter will be restored to normal position by the spring H^{12}. The drop H^{27} may also be restored to its normal position, and then the operator at central may withdraw the jack from H^{28} and permit the spring-contact H^4 to engage H^5, and then the circuit from the generator A at the calling substation will be again completed to enable the person at such substation to ring off, after which the operator at central will restore the parts at the several substations to normal position, as will be explained hereinafter. Assuming now that the parts are in normal position and central desires to call up a substation—say *a*—the operator at central will first send a comparatively weak current over the lines X X and X to energize the magnet E at each substation to release the arms B and bring them to the position shown in Fig. 2.

As before stated, the magnets C at the substations are polarized, and we will assume that the magnets at substations *a* and *b* will respond to a − current and those at *c* and *d* to a + current. At each substation there is also a bell D of the same polarity as the magnet at its substation. When, therefore, the

operator at central desires to call substation *a*, he will send out a — current over the line X to wire E′, magnet E, wire E², contact E³, brush C′, wire C², through magnet C to wire C³, brush C⁴, contact C⁵, brush C⁶, wire C⁷, through bell D to wire C⁸, wire E⁵ to the ground and back to central. This will ring bell D at substation *a*, energize magnet C at the same substation, and attract its armature C⁰, and thereby close its receiver-circuit at G³, G⁴, and G⁵, and when the person at this substation lifts the receiver from the hook the receiver-circuit will be completed, as before described. The magnet E at substation *c* is also connected to the wire X; but the magnet C and bell D at this substation will not respond to a — current. They would, however, respond to a + current sent over the wire X, and the magnet C and bell D at substation *b* will respond to a — current sent over wire X X, while those at substation *d* will respond to a + current sent over wire X X. As the arms B at the respective substations have been operated, no other substation on the line can call central or hear the conversation except in the case where the call is from one substation to another on the same line.

It is desirable to provide some means for informing a person desiring to call central when the line is busy that such is the fact, and I preferably employ an audible signal for this purpose, which is operated by a current from the generator A. As before stated, when a call is sent from central or to central all the arms B are moved from the position indicated in Fig. 1 to the position indicated in Fig. 2, and then the contact F³ on said arm has been disengaged from brush C⁴ and become engaged with brush K′, and a circuit is then established from generator A to wire F⁷, contact F⁶, brush F⁵, wire F⁴, contact F³, brush K′, wire K², bell K, wire K³ to wire F⁹, back to the generator A. If then any subscriber operates his generator, he will ring the bell K at his substation, and so be notified that the line is busy.

As before stated, the magnet C at each substation is polarized and will attract its armature only when a positive or negative current, as the case may be, is sent through it. If after a magnet C has been energized to attract its armature and close its receiver-circuit the operator at central should accidentally or otherwise send a current of opposite polarity over the line, the armature of the magnet C would be repulsed and its receiver-circuit broken, and it is therefore desirable to provide means to prevent this action.

Many devices might be employed for this purpose, and in Figs. 3 and 4 I have illustrated a preferred means for accomplishing this result. In Fig. 4 the parts are shown in normal position with the armature C⁰ engaging one pole of the magnet C. I provide an arm 30 of non-magnetic material and to which I attach the various contacts, such as F⁶ and G⁴, in any convenient manner and at any convenient points, not necessary to illustrate in these figures. This arm is provided with an opening 31 of sufficient size to receive the armature C⁰ loosely, as clearly shown in Fig. 3. The armature is provided with trunnions 32, rigidly connected to it, and these pass loosely through holes 33 in opposite walls of the opening 31 and will form the pivotal support of the armature and also of the arm 30. Near one end of the opening 31 I secure a bridge 34 to the arm, which extends across the opening in position to be engaged by one end of the armature. When the parts are in normal position, as in Fig. 4, if current of the proper polarity be sent through the magnet the armature will be attracted to the other pole of the magnet and by its engagement with the bridge 34 will carry the arm 30 with it. If the operator at central should now send a current of opposite polarity over the line, the armature C⁰ will be restored to normal position, but it will move away from the bridge 34, and consequently will not move the arm 30, as there is not sufficient friction between the trunnions and the openings 33 to move the arm. The arm 30, therefore, after once being moved by the armature C⁰ will not be again affected by it until after it has been restored to its normal position, as will be hereinafter explained.

I will now describe the means preferably employed for resetting the arm B and the armature C⁰ and the arm 30. The magnet E is utilized for this purpose, and all the resetting is effected by the movement of the armature E⁰. To effect this, it is necessary to move the armature E⁰ its full stroke toward the magnet E and overcome the resistance of the spring E¹⁸, and therefore a stronger current must be used to effect this result. The means for sending this current over the wires will be described hereinafter. This current passes from the wires X X and X to wires E′ and through the magnets E. As the path is the same in each case, we will describe it in one. The arms B are in the position indicated in Fig. 2. From the magnet E the current passes to wire E², to contact E³, brush C′, wire C², magnet C, wire C³, brush C⁴, contact C⁵, brush C⁶, wire C⁷, bell D, wire C⁸, wire E⁵ to the ground, and thence back to central. This energizes the magnet E, and its armature begins to move toward it and by the time it begins to overcome the resistance of spring E¹⁸ contact E⁷ on the armature will be engaged with brush E⁸ and a direct circuit from magnet E is established to the ground, as follows: from E to wire E², wire E⁶, contact E⁷, brush E⁸, wire E⁹, and wire E⁵. When this circuit has been established, the arm B will have begun to move toward its normal position, and brush C′ will be disen-

gaged from contact E^3, and the circuit through magnet C and bell D will thus be broken, and these two parts will then offer no resistance to the current passing through E, and it will be enabled to exert its full force in attracting the armature E^0.

We will now refer to Figs. 4 and 5, which illustrate a preferred means for transmitting movement from E^0 to the arm B and to the arm 30 and armature C^0. In Fig. 4 the parts as illustrated in full lines are in normal position. If the armature C^0 is operated, the end *x* of the arm 30 will move up into close proximity, but not into contact with the end of the set-screw 36 in the armature E^0. There must be sufficient space between them to permit the movement of the armature E^0 to release the finger *e* from finger *b'*, as indicated in dotted lines, and when these fingers are disengaged arm B will move into the position indicated by dotted lines, when it will engage the stop 21, (shown in this case as a pivoted bar resting on a stud 37.) A bolt 38 is connected at one end to the stop and extends loosely through an opening in the armature E^0 near one end thereof. This bolt is provided with two adjustable stops, (shown in this case as nuts 39 and 40,) one above and the other below the armature E^0. These stops are so arranged that when the armature is in its normal position neither will engage the armature. When the magnet E attracts its armature to release the fingers *e* and *b'*, the armature will be free to move until it is arrested by the spring E^{18} without lifting the bolt 38, and this movement will be sufficient for this purpose. When, however, the magnet E operates to reset arm B and armature C^0, the armature E^0 will make a complete stroke and carry the bolt 38 up to the position shown in Fig. 5, which will move the pivoted stop 21 to a position at right angles to the arm B, and thereby force the latter back to its normal position. When the armature E^0 is released, the springs will force it back and bring its finger *e* in position to intercept finger *b'*, and then it will engage stop 40 and force the bolt 38 downward, and thereby disengage the stop 21 from arm B, and the stop 21 and bolt 38 will then complete their return to normal position by gravity. The complete movement of the armature E^0 under the influence of magnet E will also cause the set-screw 36 to engage the end *x* of the arm 30, and thereby restore it and the armature C^0 to normal position.

Various means may be devised for sending the necessary currents over the wires X and X X by the operator at central, and in Fig. 6 I have shown apparatus which may be used for this purpose. Thus for sending the strongest current over the wires X and X X for energizing the magnets E to effect the resetting operation I provide a battery or other source of electrical supply S of the necessary capacity and provide a switch-lever S', having contacts S^2 and T insulated from each other. Brushes S^3 and S^4, adapted to be engaged by the contact S^2, are respectively connected to wires X X and X. One pole of the battery S is electrically connected by a wire S^5 to the contact S^2 and the other pole to the ground. When the switch-lever S' is moved to engage contact S^2 with brushes S^3 and S^4, current from the battery will be sent over both line-wires X X and X through magnets E to the ground, as already described, and back to battery S.

A portion of the same battery S may be utilized for energizing magnets E for the purpose of releasing the arms B, which does not require so strong a current. Thus the contact T is electrically connected by a wire T' with a portion only of the battery, as shown in Fig. 6. Two brushes T^2 and T^3, adapted to be engaged by contact T, are respectively connected to wires X X and X, and when switch-lever S' is moved to engage contact T with brushes T^2 and T^3 current from a portion of battery S will flow over wires X X and X through magnets A to the ground and back to the battery S.

The current for energizing magnets C and bells D is preferably a continuous vibratory current, and in Fig. 6 I have shown one means for sending a current of this character over the lines X and X X. Thus the line X is connected to a pivoted switch O by a wire O', and the line X X is connected to a similar switch O^2 by a wire O^3. A battery or other suitable generator O^4 is provided, and the positive pole thereof is connected to a contact O^5, adapted to be engaged by either of the switches O or O^2, and its negative pole is connected to a contact O^6, adapted to be engaged by either of the switches O or O^2. A commutator is provided in each connection between said contacts and the battery, and the latter is connected to the earth. If the switch O be rocked to engage O^6, a negative current will be sent over line X, through magnets C, and return by the ground to battery O^4. If switch O engages O^5, a positive current will be sent over line X and return through the ground to battery O^4. By operating switch O^2 the same effects take place over wire X X.

Referring now to Fig. 7, wherein I have illustrated diagrammatically an apparatus at central and an apparatus at one substation on a party-line in a central-energy system, it will be observed that the magnets E and C are employed in substantially the same relations as in the system heretofore described. The generator F and its circuits are, however, omitted. In this case the removal of the receiver G from its supporting-hook will serve

to send a signal to central and automatically send a current from central through the magnet C to close its receiver-circuit.

Assuming the receiver G to be lifted from its hook D^2, a circuit will be established as follows: from hook D^2 to wire D', line-wire X X, through battery M^2 at central, contacts M^3 and M^4, wire M^5, magnet M, wire M^6 to line-wire X, to wire C^{13}, brush C^{12}, contact C^{11}, brush C', wire C^9, magnet C, wire C^{15}, brush C^{16}, contact C^{17}, brush C^{18}, wire C^{19}, contact C^{20}, to hook D^2. Current will then flow through magnet C from battery M^2 and energize said magnet, thereby attracting its armature C^0 and closing its receiver-circuit at G^3, G^4, and G^5. At the same time the magnet M will be energized and attract its armature M^0, which will release the drop and at the same time engage contact M^7 with brushes M^8 and M^9 and contact M^{10} with brushes M^{11} and M^{12}. Current from the battery M will now flow over both line-wires X and X X to energize all the magnets E on the party-line, as before described, that for line X X flowing direct from the battery to the line-wire X X and returning through the magnets E, connected to that wire, the ground, and contact M^{10} and brushes M^{11} and M^{12} to the battery and that for line X flowing from the battery over wire M^{13} to brush M^9, contact M^7, brush M^8, and wire M^6 to wire X and returning through the magnets E, connected to that wire, the ground, and contact M^{10} and brushes M^{11} and M^{12} to the battery. Part of the current over M^{13} will also pass through magnet M back to the battery, and thereby keep the magnet energized and insure the operation of all the magnets E.

It will be observed that the magnets C are connected across the line-wires X and X X, and each will respond to the action of current from battery M^2, irrespective of its polarity, when its circuit is closed by its hook D^2 engaging the contact C^{20}. To effect this action, however, it will be necessary to make slight changes in the connections between magnet C and the brushes C' and C^{16}. Thus, assuming that magnet C in Fig. 7 will respond to a negative current a magnet C on the same line polarized to respond to a positive current would have its wire C^9 connected to brush C^{16} and its wire C^{15} connected to brush C', thus sending the current through it in a reverse direction.

So far as sending out currents from central by an operator thereat for operating magnets E and C for the purposes already described in connection with Fig. 1 is concerned, the operations will be the same. In this case the circuit for the signal-bell K is somewhat differently arranged from that in Fig. 1 and is as follows: All bell-circuits are normally open at K' and C^{22} and at the hook D^2 and contact C^{20}. When the arm B is operated, however, the circuit will be closed at K' and C^{22}, and then if a subscriber lifts his receiver from the hook at a substation other than one that may be using the line a circuit will be closed through the bell at such substation as follows: from hook D^2 to contact C^{20}, wire C^{19}, wire C^{21}, contact C^{22}, brush K', wire K^2, through bell K to wire K^3, brush K^4, contact K^5, brush K^6, wire K^7, local battery K^8, to hook D^2. At any substation, however, where magnet C has operated to close its receiver-circuit the local bell-circuit will be broken at K^4, K^5, and K^6, and the removal of the receiver from the hook will not result in the ringing of bell K.

Without limiting myself to the precise details of construction illustrated and described, I claim—

1. In a telephone system for party-lines, the combination with the main-line wires leading from a central station, of a series of telephone-receivers each independently connected to the line-wires by an open electric circuit, a polarized magnet and an armature at each substation for closing the circuit of its receiver, and a generator at each substation under the control to the person thereat for sending an alternating current through said magnet to energize it, substantially as set forth.

2. In a telephone system for party-lines, the combination with the main-line wires leading from a central station, of a series of telephone-receivers each independently connected to the line-wires by an open electric circuit, a polarized magnet and an armature at each substation for closing the circuit of its receiver, and means at each substation under the control of a person thereat for sending a current through said magnet to energize it, to first close its own receiver-circuit, and then close a circuit at the central station for sending a current over the main-line wires to operate devices for preventing the closure of the receiver-circuit at any other substation on the line by a person thereat, substantially as set forth.

3. In a telephone system for party-lines, the combination with the main-line wires leading from a central station, of a series of telephone-receivers each independently connected to the line-wires by an open electric circuit, a receiver-circuit closer at each substation including a polarized magnet and an armature, a signal at the central station, and a generator at each substation under the control of a person thereat for sending an alternating current through said magnet to energize it and cause it to close its own receiver-circuit, and also close a circuit to the central station to operate the signal thereat, substantially as set forth.

4. In a telephone system for party-lines, the combination with the main-line wires

leading from a central station, of a series of telephone-receivers each independently connected to the line-wires by an open electric circuit, a receiver-circuit closer at each substation including a polarized magnet and an armature, a signal at the central station, and a generator at each substation under the control of a person thereat for sending an alternating current through said magnet to energize it and cause it to close its own receiver-circuit, and also close a circuit to the central station to operate the signal thereat, and also close a circuit at the central station for sending a current over the main-line wires to operate devices for preventing the closure of the receiver-circuit at any other substation on the line by a person thereat, substantially as set forth.

5. In a telephone system, the combination with the main-line wires leading from a central station, of a telephone-receiver connected to said line-wires by an open electric circuit, a polarized magnet and an armature adjacent to said receiver, means for sending a current of the desired polarity through the magnet to operate its armature to close the receiver-circuit, and means for preventing said magnet from breaking said receiver-circuit when a current of opposite polarity is sent through it, substantially as set forth.

6. In a telephone system, the combination with the main-line wires leading from a central station, of a telephone-receiver connected to said line-wires by an open electric circuit, a polarized magnet and an armature adjacent said receiver, an arm pivotally supported adjacent said armature and carrying devices for closing said receiver-circuit and means for transmitting movement from the armature to said arm to close the receiver-circuit when the magnet is energized by a current of one polarity but inoperative to move said arm when the magnet is energized by a current of opposite polarity, substantially as set forth.

7. The combination with main-line wires, of a telephone-receiver connected thereto by an open electric circuit, a polarized magnet and a pivoted armature, an arm carrying devices for closing the receiver-circuit, said arm having an opening into which the armature loosely fits and being pivotally supported on the pivots of the armature, and a bar secured to the arm and extending across said opening to be engaged by one end of the armature, substantially as set forth.

8. In a telephone system for party-lines, the combination of main-line wires leading from a central station, of a series of telephone-receivers each connected to the line-wires by an open electric circuit, a polarized magnet and armature at each substation for closing its own receiver-circuit, a polarized bell at each substation, a non-polarized magnet at each substation, and means operated by the non-polarized magnet for electrically connecting the polarized magnet, the polarized bell and itself in series to receive a polarized current over the main-line wires from the central station, substantially as set forth.

9. In a telephone system for party-lines, the combination of main-line wires leading from a central station, of a series of telephone-receivers each independently connected to the line-wires by an open electric circuit, a polarized magnet and armature at each substation for closing its own receiver-circuit, a non-polarized magnet at each station, means for sending a current from the central station over the line-wires to energize the non-polarized magnets, means operated by the non-polarized magnets to prevent the closure of their respective receiver-circuits by persons at the respective substations, and means for sending a polarized current from the central station for operating the polarized magnets selectively to close their respective receiver-circuits, substantially as set forth.

10. In a telephone system for party-lines, the combination of main-line wires leading from a central station, of a series of telephone-receivers each independently connected to the main-line wires by an open electric circuit, a polarized magnet and armature at each substation for closing its own receiver-circuit, a polarized bell at each substation, a non-polarized magnet and armature at each substation connected to one of the line-wires, the said magnets and bell being normally de-energized, and circuit-closing devices controlled by said non-polarized magnet for electrically connecting the bell and magnets at each station in series, substantially as set forth.

11. In a telephone system for party-lines, the combination of main-line wires leading from a central station, of a series of telephone-receivers each independently connected to the main-line wires by an open electric circuit, a polarized magnet and armature at each substation for closing its own receiver-circuit, a polarized bell at each substation, a non-polarized magnet and armature at each substation connected to one of the line-wires, the said magnets and bell being normally deënergized, a pivoted arm carrying circuit-closing devices normally biased to move in one direction and restrained from such movement by the armature of the non-polarized magnet, and means for sending a current through said non-polarized magnets for releasing said arm to close circuits for connecting the bell and magnets at each station in series, substantially as set forth.

12. In a telephone system for party-lines, the combination of main-line wires leading from a central station, of a series of telephone-receivers each independently connected to the main-line wires by an open electric circuit, a polarized magnet and armature at

each substation for closing its own receiver-circuit, a polarized bell at each substation, a non-polarized magnet and armature at each substation connected to one of the line-wires, the said magnets and bell being normally de-energized, a pivoted arm carrying circuit-closing devices normally biased to move in one direction and restrained from such movement by the armature of the non-polarized magnet, means for sending a current through said non-polarized magnets for releasing said arm to close circuits for connecting the bell and magnets at each station in series, and means operated by the non-polarized magnet for restoring the arm to normal position, substantially as set forth.

13. The combination with the main-line wires, of a telephone-receiver connected thereto by an open electric circuit, a magnet C and armature for closing said circuit, a bell, a second magnet E connected to one of the line-wires, an armature for said magnet, said magnets and bell being normally out of circuit with each other, a pivoted arm carrying circuit-closing devices, said arm being normally biased to move in one direction and restrained from such movement by the armature of the magnet E, means for sending a current through the magnet E to attract its armature and release said arm to close circuits for connecting the said magnets and bell in series, substantially as set forth.

14. The combination with the main-line wires, of a telephone-receiver connected thereto by an open electric circuit, a magnet C and armature for closing said circuit, a bell, a second magnet E connected to one of the line-wires, an armature for said second magnet, said magnets and bell being normally out of circuit with each other, a pivoted arm carrying circuit-closing devices, said arm being normally biased to move in one direction and restrained from such movement by the armature of the magnet E, means for sending a current through the magnet E to attract its armature and release said arm to close circuits for connecting the said magnets and bell in series, a pivoted bar forming a stop to limit the movement of the said arm, and connections between said bar and the armature of the magnet E for restoring said arm to its normal position, substantially as set forth.

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

KOBY KOHN.

Witnesses:
C. A. ATKINSON,
F. L. B. JENNEY