

G. BARCOCK.
ALARM AND TELEPHONE SYSTEM.
APPLICATION FILED DEC. 2, 1904.

911,565.

Patented Feb. 9, 1909.
2 SHEETS—SHEET 1.

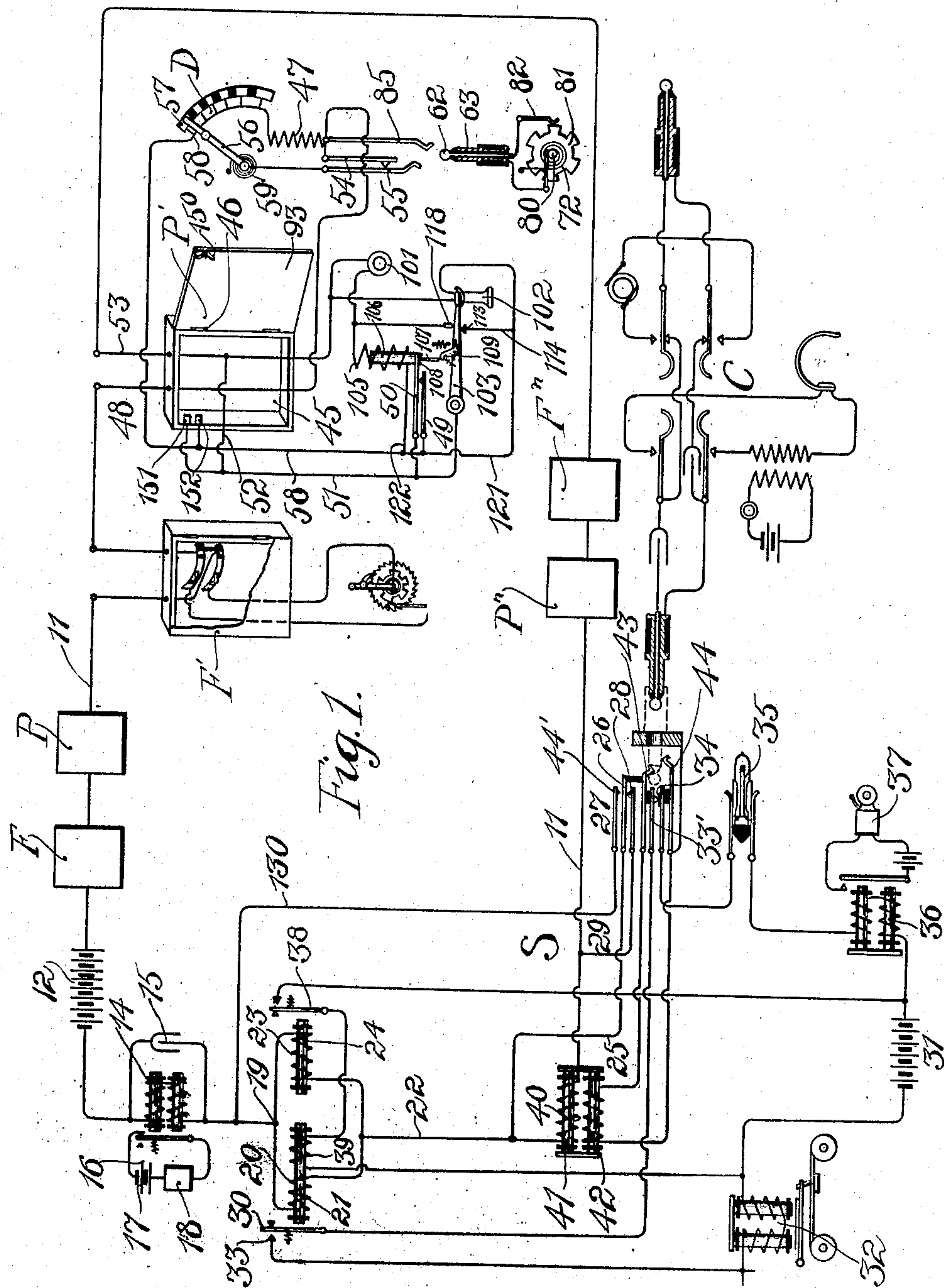


Fig. 1.

WITNESSES:

Arthur H. Boettcher,
Leonard W. Novander

Inventor
Garrison Babcock
Charles A. Brown
Attorney

G. BABCOCK.
ALARM AND TELEPHONE SYSTEM.
APPLICATION FILED DEC. 2, 1904.

911,565.

Patented Feb. 9, 1909.
2 SHEETS—SHEET 2.

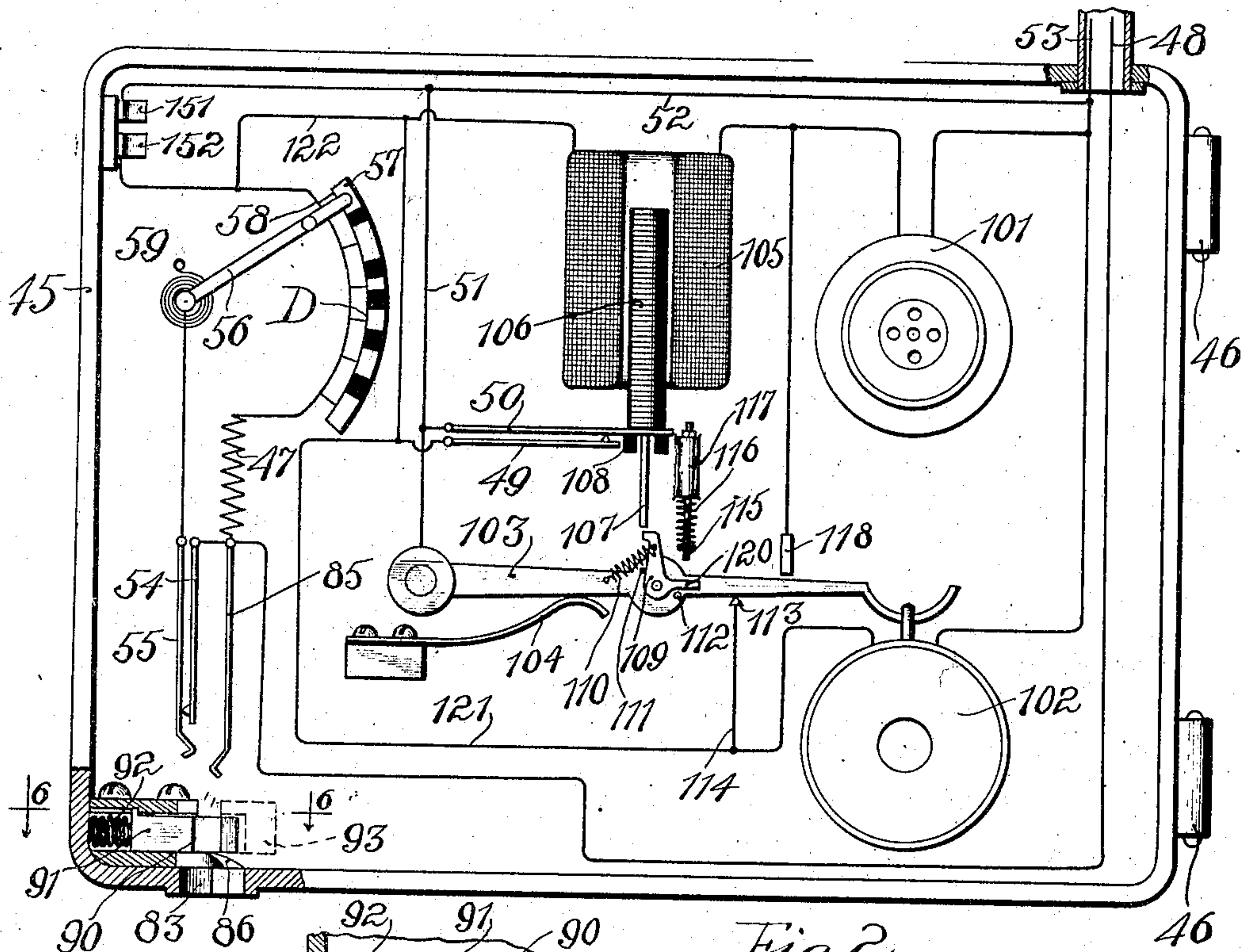


Fig. 2.

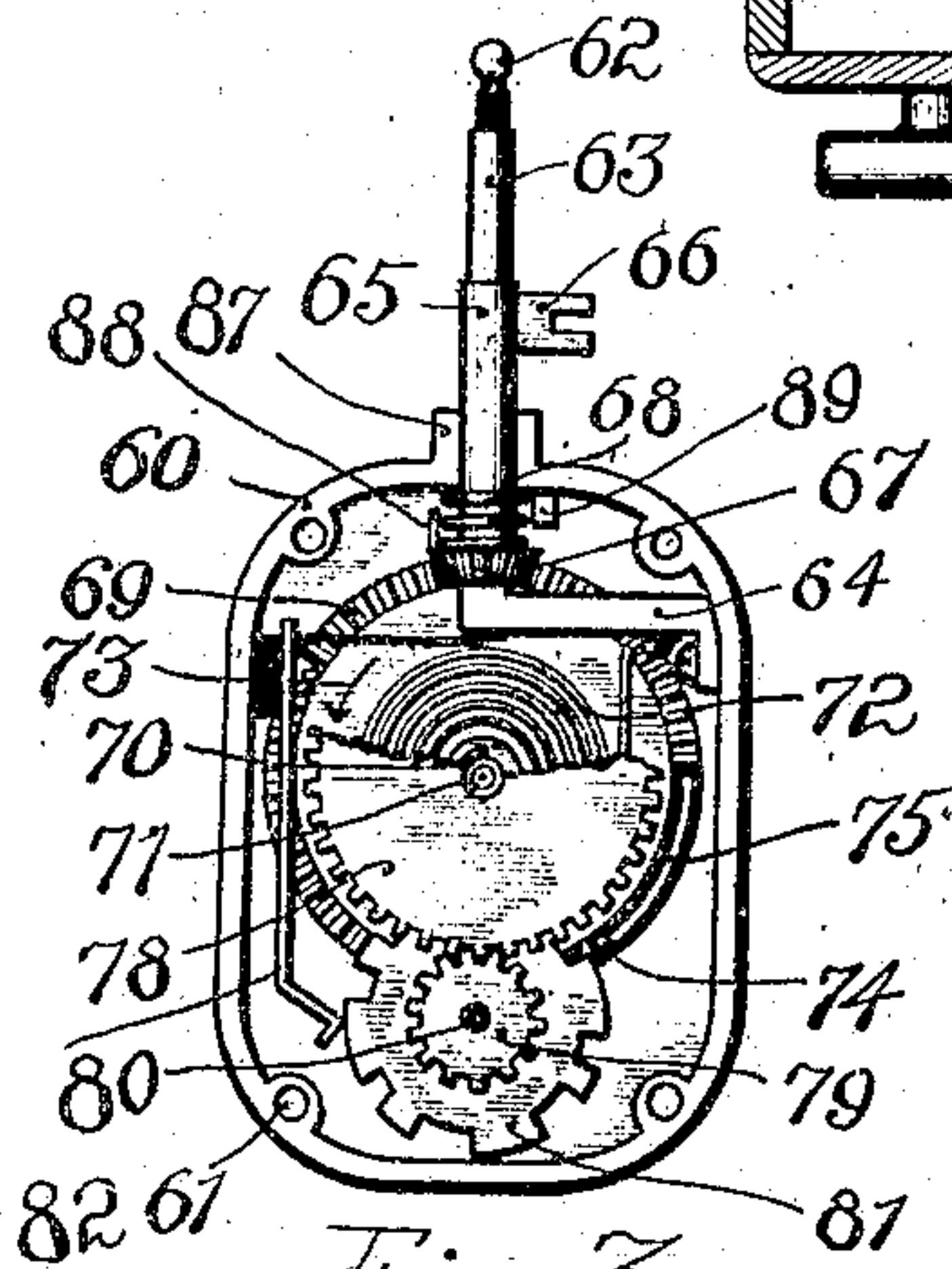


Fig. 3.

Fig. 6.

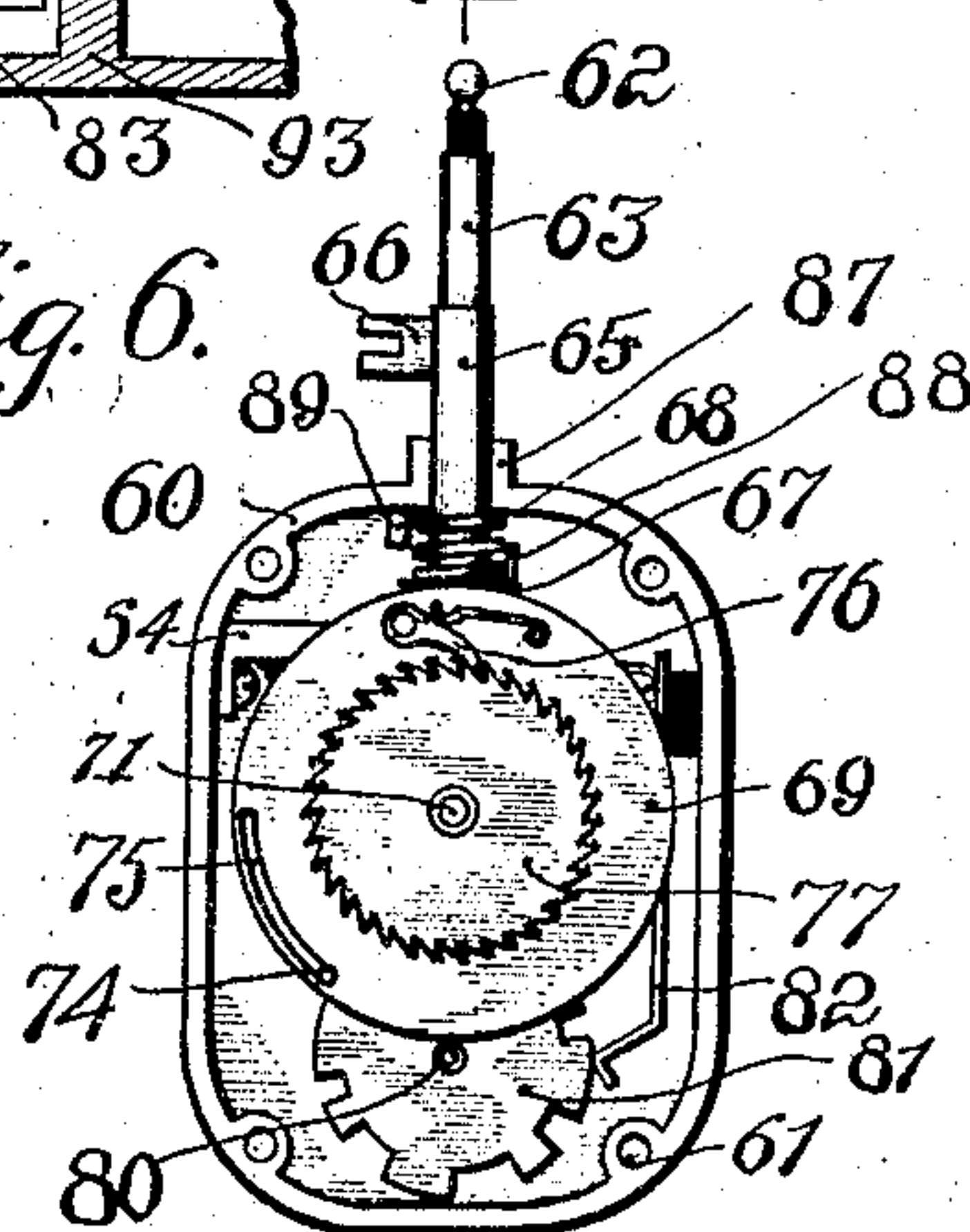


Fig. 4.

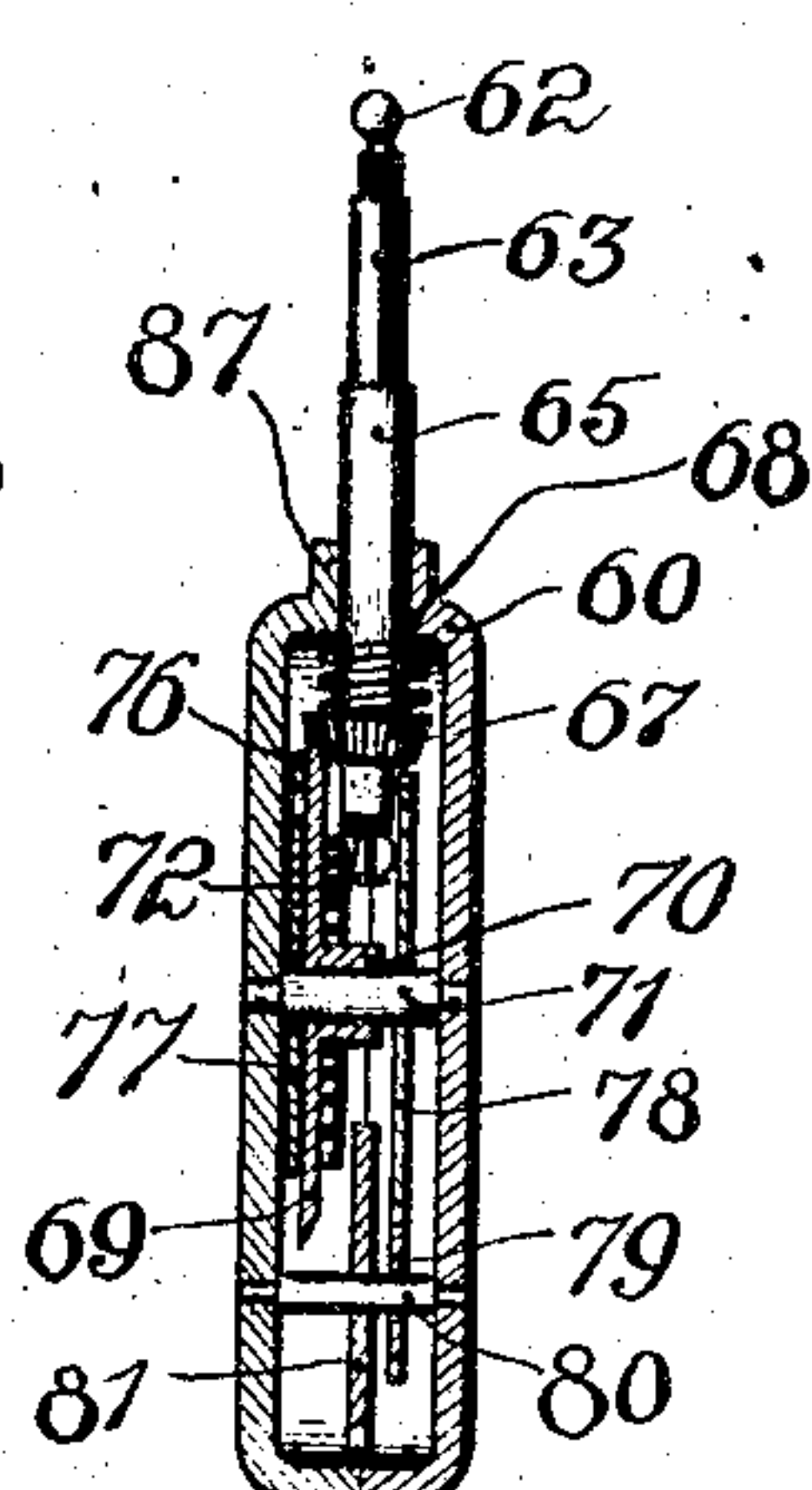


Fig. 5.

WITNESSES:

Arthur H. Boettcher
Leonard W. Novander.

Inventor
Garrison Babcock
By Charles A. Brown
Attorney.

UNITED STATES PATENT OFFICE.

GARRISON BABCOCK, OF ROCHESTER, NEW YORK, ASSIGNOR TO MERTON E. LEWIS, OF ROCHESTER, NEW YORK.

ALARM AND TELEPHONE SYSTEM.

No. 911,565.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed December 2, 1904. Serial No. 235,155.

To all whom it may concern:

Be it known that I, GARRISON BABCOCK, citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Alarm and Telephone Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to a combined fire alarm, police signal and telephone system, and, in general, may be considered as an improvement or addition to the system explained in my United States Patent No. 807,235, issued December 12, 1905. In that patent I have explained a circuit wherein fire alarm signals or police signals or telephone messages may be transmitted over a single circuit and indicated upon specialized signal-receiving apparatus at a central office or at a number of central stations, the transmission of a signal or message of one nature having no effect whatever upon the signal-recording apparatus intended for the indication of signals of another nature.

The addition which forms the subject matter of the present invention lies principally in the provision of a police signal and telephone equipment, whereby a policeman or watchman in operating the signal-sending apparatus at the various police boxes, to indicate that the proper round or beat is being made, must necessarily cause the actuation of signaling mechanism which will indicate at the central station which policeman or watchman has actuated the signal-sending device at a particular box.

My invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is a diagrammatic drawing of the circuit arrangements employed; Fig. 2 is a diagrammatic drawing of the policeman's telephone box, the cover being removed to more clearly illustrate the interior mechanism; Fig. 3 is a front elevation of the policeman's box key, the upper half of the shell of the key being removed; Fig. 4 is an elevation of the key from the other side, with the other half of the shell removed; Fig. 5 is a central longitudinal section of the key, taken on line 5—5 of Fig. 4; and Fig. 6 is a detailed view of the lock for the policeman's

box, taken in the direction of the arrow 6 in Fig. 2.

In the drawings I have illustrated a main circuit wire 11 leading from the central station S to a series of fire alarm boxes F, F', F'', &c., and also to a series of police boxes, P, P', P'', &c.

The fire alarm boxes, which need not be specifically described in the present application, as their construction is well known to those skilled in the art, provide means for interrupting the circuit in accordance with a predetermined code, the breaks in the circuit being of different lengths and sequence, according to a code employed, by means of which the signal recorded at the central station indicates which of the fire alarm boxes has been manipulated.

The main circuit leads through a main battery 12, to the central station, where a relay 14 is included in the circuit, this relay being of considerable impedance and shunted by the condenser 15. The relay 14 controls, by means of its armature, a local circuit 16, including a source of current 17, and suitable indicating or recording means 18. The relay 14 and its armature are so adjusted that an absolute break in the main circuit, causing the complete cessation of the flow of current, will cause the retraction of the armature to interrupt the local circuit and cause the actuation of the signaling apparatus 18. A slight weakening of the current, however, due to the inclusion of a resistance in the main circuit, will not sufficiently deenergize this relay to permit of the retraction of its armature. The main circuit divides at 19, one path leading through the winding 20 of the sensitive relay 21 and thence to conductor 22. The relay 21 may preferably be in the form of a volt meter movement arrangement with a contact. The other path leads through the winding 23 of the non-sensitive Morse type relay 24, and thence to the conductor 22. The main circuit is normally completed by way of the conductor 25 leading to the contact spring 26 of a spring-jack 27 and thence through a normal resting contact 28 and conductor 29 to the main wire 11 leading out from the central station. The sensitive relay 21 is provided with an armature 30, which upon its retraction closes the local circuit leading from the local battery 31 through the code-signal-recording device 32, to back contact 33, armature 30,

contact spring 33' of spring-jack 27, contact 34 of the spring-jack, and thence through the signal lamp 35 and the relay 36 controlling the signal bell 37 back to the other side of the battery 31.

The relay 24 controls, by means of its back contact armature 38, a local circuit through the winding 39 of the sensitive relay 21. The repeating coil 40 has one of its windings 41 included in a branch of the main circuit although this branch is normally short-circuited by the contact springs 26 and 28. The other winding 42 of the repeating coil is connected to the tip sleeve springs 43 and 44 of the spring-jack 27. An operator's cord circuit is shown at C, this circuit being provided with the usual operator's set and signaling devices, and terminates in plugs either of which may be inserted within the spring-jack 27. As indicated by dotted lines, the insertion of the plug within the spring-jack causes the movement of the contact springs heretofore mentioned, whereby the connection between the springs 33' and 34 is broken, and whereby the connection between the springs 26 and 28 is broken, but whereby the connection is established between the spring 26 and a contact 44'. The mode of operation of this central station equipment will be hereinafter explained.

The circuit arrangements of the police box are indicated both in Fig. 1 and in the enlarged Fig. 2, similar characters of reference being applied in both figures to like parts. The police box comprises a case 45, preferably of metal, to which a cover is attached by means of hinges indicated at 46. The police box includes a code-signaling device D, consisting essentially of means for cutting the resistance 47 intermittently into the main circuit. The main circuit enters the box by way of conductor 48 and leads to one terminal of the resistance 47. The other terminal of the resistance is connected with the contact spring 49, which normally makes connection with the contact spring 50, this spring being connected by way of conductors 51 and 52 with conductor 53 leading to the main circuit. Resistance 47 is normally shunted out of the main circuit by way of the contact spring 54 engaging the tip spring 55 of a spring-jack, this tip spring being connected with a switch arm 56, which rests upon its normal contact 57, this contact being connected by way of the conductor 58 with the contact spring 49, which normally is connected with the box terminal 53 leading to the main circuit.

It will be noted that the depression of the switch arm 56 and its return to its normal position, due to the tension of the spring 59, will cause the intermittent inclusion of the resistance 47 in the main circuit. It will be noted also that the resistance may be included in the circuit by breaking the connec-

tion between the tip spring 55 and the contact 54. The code signal which is sent in by the actuation of the lever 56 is arranged to indicate at the central station the number of the box from which the call is sent. My invention provides also a key for each policeman, by which the policeman must send in and record his own number before he can open the box to actuate the switch lever 56. Each policeman is provided with a key, such, for instance, as that illustrated in Figs. 3, 4 and 5, each key consisting of a shell 60, preferably made in two halves, these halves being secured together at the points 61. The key carries a connecting plug at its forward end, the connecting plug comprising the tip 62 and the sleeve 63 insulated from each other. The sleeve of the plug is electrically and mechanically connected with the shell by way of the support 64.

Surrounding the lower part of the sleeve of the plug there is a tube 65, which carries the tongue 66 of a key adapted to unlock the cover of the police box. Upon the inner end of the tube the small bevel gear 67 is mounted. The spiral spring 68 presses the small bevel pinion into engagement with a bevel gear 69, this bevel gear being provided with a hub 70, and being rotatably mounted upon the shaft 71. The sleeve 63 may rotate within the tube 65 and is capable also of a longitudinal movement with reference thereto, whereby the pinion 67 may be withdrawn from mesh with the gear 69. A spiral spring 72 is attached at its inner end to the hub of the bevel gear 69 and at its outer end to the shell of the key. The tendency of this spring is to cause a rotation of the bevel gear in the direction of the arrow 73, the motion of the gear being limited by a pin 74 engaging one end of a concentric slot 75 cut in the bevel gear 69. To the back of the gear wheel 69 is fastened a pawl 76, this pawl engaging with the teeth of a ratchet wheel 77, mounted upon the shaft 71, the shaft and ratchet wheel being securely fastened together. The shaft 71 carries also a spur gear 78, which meshes with a pinion 79 mounted upon a shaft 80, which carries also a metallic break wheel 81. The break wheel is provided with a series of notches in its periphery corresponding with an electrical code signal indicating the policeman's number, as will hereinafter more fully appear, the break wheel normally making engagement with a contact spring 82 insulated from the shell of the key and electrically connected, as shown, with the tip 62 of the plug.

In opening the box a policeman inserts his key into the opening 83 in the bottom of the box and turns the key in the direction of the arrow 84 in Fig. 6. The tip and sleeve of the plug engage the tip and sleeve springs 55 and 57 of the spring-jack within the box, the insertion of the plug causing the separati-

of the contacts 54 and 55. The short-circuit about the resistance 47 is not, however, broken by this insertion, the circuit now being traced from the sleeve spring 85 through the sleeve of the plug to the metal case of the key and thence through the break wheel 81 to the contact spring 82, to the tip 62 of the plug, and thence to the tip spring 55.

10 The policeman, in turning the shell of the key, brings the tongue 66 into engagement with projection 86 on the inside of the case 45, this projection having an inclined upper surface, as shown. In order to turn the

15 tongue within the box, it would be necessary to compress the spiral spring 68, for the reason that the shoulder 87 engages the outside of the case at the periphery of the key hole. The tension or pressure of the spring 68 being considerable, however, and tending to

20 force the tube 65 toward the shell of the key, the result is that the light spiral spring 72 is overcome and the shell of the key is turned with reference to the tongue 66 and the tube 65 and bevel pinion 67 attached thereto.

25 This turning motion continues until the pin 88 extending from the edge of the pinion 67 engages a stop 89 carried upon the shell of the key. The rotation of the pinion 67 and the tongue 66 with reference to the shell of

30 the key is approximately one-quarter revolution. This turning motion causes a rotation of the bevel gear 69 with reference to the shell of the key, this rotation being in the direction opposite to that indicated by

35 the arrow 73 and in such a direction that the pawl 76 slips over the teeth of the ratchet wheel without causing rotation of the shaft 71 and the gear train attached thereto. At the time the pin 88 engages the stop 89, and

40 when also, for safety's sake, the pin 74 engages the end of its slot 75, a turning moment is transmitted directly to the tube 65 and the tongue 66, without the intervention of the weak spring 72. The tongue 66 is

45 turned, therefore, within the case 45, the turning motion of the tongue 66 and the entire shell of the key being simultaneous for say a quarter revolution, when the inclined upper surface of the projection 86 serves to

50 withdraw the tube 65 sufficiently from the shell of the key to disengage the bevel pinion 67 from the teeth of the bevel gear 69. During the first half revolution of the key shell the bevel gear 69 will, therefore, have

55 been wound up against the tension of the spring 72, and now upon its release by the disengagement of the bevel pinion 67 it will be returned to its normal position by the spring 72. In its return, however, the pawl

60 76 will engage the teeth of the ratchet wheel 77 to cause the rotation of the shaft 71, its gear 78, the pinion 79 and the break wheel 81. The ratio of gear is such that the break wheel will make one-half revolution before

65 the pin 74 engages the forward end of the

slot 75. In making this half revolution the spring 82 will intermittently make and break connection with the break wheel, whereupon the resistance 47 is alternately cut in and out of the main circuit to produce 70 a code signal at the central station corresponding with the policeman's number, as will hereinafter more fully appear. The two halves of the break wheel are symmetrical, in order that each half revolution will cause 75 the same code signal to be produced at the central office. After the tongue 66 of the key has overcome the projection 86, it is brought into contact with the face 90 of the latch 91, whereupon a continued motion of 80 the key depresses the latch against the pressure of the spring 92 to permit the door 93 of the box to be swung open.

Without stopping now to explain in detail the mode of operation of these devices, I shall 85 first describe the telephone circuit installed within the case 45. I have shown the transmitter at 101, the receiver at 102 and a telephone switch hook at 103, the receiver being supported normally by this switch hook in 90 the well known manner, the weight of the receiver serving to press the switch hook downward against the upward pressure of the spring 104. The solenoid 105 serves as the necessary impedance in the transmitter 95 circuit and also another function, which will more fully appear. Within this solenoid is mounted a core 106, comprising soft iron washers mounted upon an aluminum spindle, from which projects a downwardly extending 100 pin 107. The core rests normally upon the contact spring 50, whose downward motion is limited by the stops 108. A catch 109 is pivoted upon the switch hook, as shown, this catch being subjected to the influence of the 105 spring 110 and a stop pin 111, as well as a stop pin 112, which limits the motion in the reverse direction. The switch hook normally makes electrical connection with a contact 113 connected by conductor 114 with 110 the spring 49. At 115 I have arranged a detent shown in its normal position, but which may be moved upward by the exercise of sufficient pressure against the tension of the spring 116, the detent sliding in the 115 guide head 117. The electrical contact 118, normally out of contact with the switch hook 103, makes electrical connection therewith during upward motion thereof upon the removal of the receiver but is again disconnected 120 therefrom when the hook has reached its uppermost position.

The operation of the apparatus of my invention may be described as follows: 125 When it is desired to send in a fire alarm signal a citizen manipulates one of the boxes F to introduce a series of breaks in the main circuit, these breaks causing the actuation of the relays 14 and 24, but not of the relay 21, for the reason that the retraction of the 130

armature 38 with each break in the circuit causes the closure of a local circuit through the winding 39, the current through this winding serving to maintain the attraction of the armature 30 of the sensitive relay 21. This relay, as before mentioned, is preferably of a volt meter movement arrangement with a contact, and is therefore much more sluggish or deliberate in its movement than the relay 24, which is preferably of a Morse type. There is no actuation, therefore, of the signaling apparatus controlled by the armature 30 but only of the signal-receiving and recording apparatus included in the local circuit 16.

A policeman in sending in the reports of his rounds inserts his key within any of the police boxes upon the main circuit 11, and in turning the key to unlock the door winds up the break mechanism, subsequently releasing it, permitting the rotation of the break wheel to cut the resistance 47 in and out of the circuit upon the insertion of the key. The main circuit may be traced through the police box as follows: from the terminal conductor 48 to the sleeve spring 85, thence to sleeve contact 63, to the shell of the policeman's key, through the break wheel 81, to contact spring 82, thence to the tip 62 of the plug, to tip spring 55, to switch arm 56, to contact 57, through conductor 58, to contact spring 49, contact spring 50, conductor 51 and conductor 52 to the terminal conductor 53, which leads again to the main circuit. Upon the release of the winding mechanism of the key the connection between the break wheel 81 and the contact spring 82 is periodically interrupted in accordance with the code cut upon the periphery of the break wheel, and during these intermissions the circuit may be traced from the terminal conductor 48 to the resistance 47 and thence by way of the contact springs 49 and 50 to the other terminal conductor 53. The inclusion of this resistance 47 in the main circuit causes a weakening of the normal current, the decrease in the current being insufficient to cause the release of the armature of the relay 14 or of the armature 38 of the relay 24, but the decrease is sufficient to cause the partial deenergization of the relay 21, whereupon the armature 30 is retracted to close a local circuit through the signal-recording device 32. The flow of current in this local circuit causes also the flashing of the signal lamp 35, and, if desired, the ringing of the gong 37. The flashing of the lamp and the actuation of the signal-recording device 32 correspond with the code number cut upon the periphery of the break wheel 81. The central station operator understands, however, that the flashing of the signal lamp 35 is not a signal for telephonic communication, and does not ordi-

narly insert a plug of the cord-connecting apparatus into the springjack 27.

By the time the policeman or watchman will have turned his key sufficiently to unlock the box, the operation of the make and break mechanism contained within his key will have been completed, and upon opening the box a short-circuit will again have been established between the springs 85 and 55 by way of the normal connection of the break wheel 81 and the contact spring 82. The policeman thereupon depresses the lever 56 and permits its return to its normal position, whereupon the resistance 47 is intermittently cut in and out of the main circuit to cause a code signal to be recorded as before upon the recording instrument 32 at the central station, the code signal sent in by the actuation of the lever 56 being individual to the box. In this way a record is made at the central station not only of the box number from which the report is sent, but also of the policeman sending the report, as each policeman is provided with a key having a different code signal upon its break wheel.

If the policeman desires to hold a telephonic communication with the central station, he removes his receiver 102 from the switch hook, thereby permitting the upward movement of the switch hook, due to the pressure of the spring 104. In its upward movement the catch 109 engages the lower end of the stem 107, causing a rise of the core 106 until the catch is tripped by the engagement of the finger 120 by the detent 115. Under normal conditions the current flowing through the circuit is of sufficient strength to cause the continued upward movement of the core 106 after having been raised to an intermediate position by the upward movement of the hook switch 103. The detent 115 causes the catch to be removed from the under side of the stem for a purpose which will more fully appear. In its upward movement the core 106 causes the disconnection of the contact springs 49 and 50, which serve normally to short-circuit the telephone apparatus. The telephone circuit might be traced upon the removal of the switch hook, from the terminal wire 48 to the sleeve spring 85 to contact 54, to tip spring 55, or from the sleeve spring 85 through the policeman's key to the tip 62 of the plug, and thence to tip spring 55, to switch arm 56, contact 57, conductor 58, conductor 121 and receiver 102 to terminal wire 53. A parallel path might also be traced from the switch arm 56 to contact 57, and thence through conductor 122, solenoid 105 and transmitter 101 to the terminal wire 53. During the upward movement of the switch hook 103 and during its electrical connection with the sliding contact 118 the transmitter 101 is short-circuited, thereby preventing the inclusion of its resistance in

the main circuit and permitting the greatest possible current to flow through the solenoid 105 to continue the upward motion of the core 106 after its disengagement by the catch 109. At the end of its upward travel the receiver hook leaves the contact 18 and the transmitter will be in circuit with the winding 105 ready for use. The reason for this unusual mechanism in connection with the telephone circuit is that in case some other telephone at some other police box is already in use, it is desirable that the second policeman be unable to cut his telephone apparatus into the circuit. If, therefore, some other telephone is already in use, its resistance will be included in the telephone circuit, the path being similar to the normal telephone circuit previously traced, and the inclusion of this resistance in the circuit will cause a weakening of the current in the manner well understood by those skilled in the art. When, therefore, the second policeman, in attempting to cut his telephone apparatus into the circuit, removes his receiver 102 from the switch hook, the upward movement of the catch 109 carries with it the core 106 until the finger 120 is engaged by the detent 115, whereupon the catch is withdrawn from the under side of the stem 107 when the core is in an intermediate position within the solenoid 105. It will be remembered that under normal conditions, the strength of current within the solenoid is sufficient to carry the core on up the rest of the way to the top, but on account of the weakening of the current strength, due to the inclusion of another telephone set in the circuit, the magnetization of the solenoid 105 is not sufficient to carry this core to the top of its stroke and upon the removal of the upward pressure exerted by the switch hook, the core again falls to its normal position, closing the circuit between the springs 49 and 50, thereby short-circuiting all the telephone apparatus and producing a click in the receiver 102, which the policeman may take as a signal that the line is already in use. Upon hanging the receiver upon the switch hook, the face of the catch 109 slides upon the edge of the stem 107 until below its extremity, when the spring 110 returns it to the normal position shown in the drawing. The attempt to connect this second telephone set in the circuit causes a slight addition to the resistance in the circuit, and this might be supposed to cause the drop of the core 106 of the telephone set already in use, thereby cutting it out of service, but this is prevented due to the fact that the core is more strongly attracted when in its uppermost position than when in its intermediate position. The core of the first telephone set already in use being, therefore, in its uppermost position, will not be dropped by a slightly decreased strength of the current flowing through the

solenoid, but will be retained in its uppermost position until the conversation is completed, when upon hanging the receiver 102 upon the switch hook and returning it to its normal position a circuit is closed in shunt of the solenoid by way of the following path: from the terminal wire 48 to the sleeve spring 85 and thence by way of the contact 54 or policeman's key to the tip spring 55, thence through the switch arm 56, contact 57, conductor 58, conductor 121, contact 113, hook switch 103, conductor 51 and conductor 52 back to the terminal wire 53. The closure of this short-circuit around the telephone apparatus and the solenoid 105 causes a deenergization of the solenoid 105, whereupon the core 106 is dropped and returned to its normal position, whereupon the above described operations may be repeated.

The removal of any telephone receiver from its switch hook causes the inclusion of sufficient resistance in the main circuit to permit the retraction of the armature 30 of the sensitive relay 21, whereupon the local signal circuit is closed through the recording instrument 32 and the signal lamp 35. The closure of this local circuit being continuous causes the continued illumination of the lamp 35, which the operator takes as a signal for telephone connection, and inserting a plug of the cord circuit within the jack connects the operator's telephone set in circuit on account of the inductive relation of the windings of the repeating coil 40. The insertion of the plug serves also to short-circuit the signaling apparatus actuated by slight variations in the current strength in the main circuit, whereupon the telephonic voice currents may pass from the main circuit through the condenser 15 and conductor 130 to contact spring 44', contact spring 26, conductor 25, winding 41 of the repeating coil 40, and thence out on the main line circuit.

Upon the door of the box there is a connecting clip 150 which, upon the closure of the door, connects the contacts 151 and 152, thereby short-circuiting out the helix 105 and the telephone apparatus of the substation. This insures the system against the inclusion of the resistance of this part of the circuit except when the telephone door is open and the apparatus is presumably to be put in use and it insures also the short-circuiting of the helix to permit the solenoid 106 to be dropped into its normal position whenever the door is closed.

While I have herein shown and described a single embodiment of my invention, it will be apparent that many modifications may be made without departing from the spirit thereof, and I do not wish, therefore, to be limited to the precise construction shown, but—

Having explained my invention, I claim

as new and desire to secure by Letters Patent:

1. In an electrical alarm system, the combination with a main circuit extending from a central exchange, of signal receiving apparatus at the central exchange, a substation connected with said circuit, signaling apparatus contained in a box at said substation, a lock for said box and key mechanism for opening said box, the insertion of said key mechanism in said lock causing connection thereof in circuit with the apparatus within said box, and the actuation of said key mechanism causing signaling current to flow through said circuit to actuate the signal receiving apparatus at the central exchange.

2. In an alarm system, the combination with a main circuit extending from a central exchange, of signal receiving apparatus at the central exchange, a substation connected with said circuit, signaling apparatus at the substation contained in a box, a removable key for the box and mechanism connected with said key, the insertion of said key in the lock of the box causing connection of said mechanism with the apparatus within the box, and the actuation of said key causing said mechanism to be operated whereby signaling current is caused to flow through the circuit for actuating the signal receiving apparatus at the central exchange.

3. In an alarm system, the combination with a main circuit extending from a central exchange, of signal receiving apparatus at the central exchange, substation apparatus connected with the circuit and inclosed in a box, a switch mechanism for said apparatus, a key for said box, contacts and signaling mechanism associated with said key, said key being entirely normally disconnected and removed from said box, the insertion of the key within the lock of said box causing connection of the key contacts with said switching mechanism, and means upon actuation of said key within said lock for causing signaling current to flow through said circuit to actuate the receiving apparatus at the central exchange.

4. In an alarm system, the combination with a main circuit extending from a central exchange, of signal receiving apparatus at the central exchange, substation apparatus connected with said circuit and inclosed in a box, switch mechanism for said apparatus within said box, a key for locking said box, contacts on said key and signal producing mechanism therefor, said contacts, signal producing mechanism and key being a unitary structure, the insertion of the key within the lock of the box causing connection of the contacts with said switch mechanism whereby said signal producing mechanism is connected with said circuit, and means upon

rotation of said key to open said box for causing actuation of said signal producing apparatus whereby signaling current will flow through said circuit to actuate the signal receiving apparatus at the central exchange.

5. In an alarm system, the combination with a normally closed main circuit extending from a central exchange, of signal receiving apparatus at the central exchange, substation signaling apparatus included in said circuit and inclosed in a box, switch mechanism for said signaling apparatus through which said main circuit is normally continuous, a key for said box, and means upon actuation of said key to open said box for causing a change in the circuit conditions whereby the signal receiving apparatus at the central exchange is actuated said key upon connection forming part of the circuit.

6. In an alarm system, the combination with a normally closed circuit extending from a central exchange, of signal receiving apparatus and a source of current included in said circuit at the central exchange, substation apparatus connected in said circuit and contained in a box, a key for said box, and mechanism associated with said key in a unitary structure therewith, said key being normally entirely disconnected and removed from the box, the insertion of the key within the lock of said box causing connection of said key mechanism with said circuit, and the actuation of said key to open said box causing operation of said key mechanism to change the condition of said circuit whereby said substation receiving apparatus is actuated.

7. In an alarm system, the combination with a normally closed circuit extending from a central exchange to a substation, of signal receiving apparatus at the central exchange, signaling apparatus at the substation contained in a box, a switch mechanism for said substation apparatus, said circuit being normally continuous through said switch mechanism, a key for said box, contacts and signal producing mechanism in a unitary structure with said key, the insertion of said key in the lock of the box causing connection of the contacts with the switch mechanism whereby the circuit is opened through said switch mechanism but simultaneously closed through the signal producing mechanism, and means upon actuation of said key to open the box for causing operation of the signal producing mechanism to change the conditions of the main circuit whereby the signal receiving apparatus at the central exchange is actuated.

8. In an alarm system, the combination with a normally closed circuit extending from a central exchange to a substation, of signal receiving apparatus at the central exchange, signaling apparatus at the substation contained in a box, switch mechanism for said signal

ing apparatus through which said main circuit is normally continuous, a key for said box, contacts and signal producing mechanism associated in a unitary structure with said key, the insertion of said key within the lock of the box causing said main circuit to be broken through said switching mechanism but simultaneously closed through the signal producing mechanism of the key, and means upon actuation of the key to open the box for causing operation of the signal producing mechanism to repeatedly change the main circuit condition whereby said signal receiving apparatus at the central exchange is actuated.

9. In an alarm system, the combination with a normally closed main circuit extending from a central exchange to a substation, of signal receiving apparatus at the substation contained in a box, switch mechanism for said signaling apparatus within said box, additional mechanism normally entirely disconnected and removed from said box and contained in a unitary structure, a key for said additional mechanism to actuate the lock of said box, contacts for said additional mechanism and make-and-break apparatus therefor, the insertion of said key within the lock causing engagement of said contacts with said switching mechanism whereby said main circuit is broken at said switching mechanism but simultaneously closed through the make-and-break apparatus, and mechanism for causing operation of said make-and-break apparatus upon actuation of the key to open the lock whereby the condition of the main circuit is repeatedly changed to cause actuation of the signal receiving apparatus at the central exchange.

10. In an alarm system, the combination with a main circuit extending from a central exchange to a substation, signal receiving apparatus at the central exchange, signaling apparatus at the substation inclosed in a box, switch mechanism for said signaling apparatus, a key for said box, a gear wheel within the body part of said key, a break wheel connected with said gear wheel, a contact extending from the body part of said key and having electrical connection with said break wheel, a contact spring for said break wheel, an additional contact extending from the body part and having electrical connection with said contact spring, a sleeve for said key extending from the body part and having driving connection with said gear wheel at its inner end, a tongue extending from said sleeve, the insertion of said key within the lock of the box causing connection of the key contacts with the switch mechanism within the box whereby the signaling apparatus is connected with said make-and-break mechanism

within the key body, and means upon motion of said key to actuate the lock to open the box for causing rotation of said gear wheel thereby causing signaling current to flow through the main circuit to actuate the receiving apparatus at the central exchange.

11. In an alarm system, the combination with a main circuit extending from a central exchange to a substation, of signal receiving apparatus at the central exchange, switch mechanism and, signaling apparatus at the substation inclosed in a box, a key for said box, a gear wheel within the body part of said key, a driving spring for said gear wheel, a code signal break wheel geared to said gear wheel to be driven thereby, a contact spring for engaging said break wheel, a contact plug extending from the body part, a tip contact for said plug connected with said contact spring, a sleeve contact for said plug having electrical connection with the break wheel, a rotatable sleeve extending from the body portion and surrounding the plug, a pinion at the end of said sleeve for engaging said gear wheel, a key tongue extending from said sleeve, the insertion of said key within the key hole of the box causing connection of the plug contacts with the switch mechanism within the box whereby the make-and-break mechanism within the key is connected with the main circuit, the rotation of the key body with respect to the sleeve causing rotation of said gear wheel and energization of the driving spring, and means upon further rotation of the key body to cause the key tongue to engage the latch of the lock to open the box causing release of the pinion from the gear wheel whereby the energized spring may cause a reversed rotation of the gear wheel thereby actuating the make-and-break apparatus connected with the main circuit.

12. In an alarm system, the combination with a normally closed circuit extending from a central exchange to a substation, of signal receiving apparatus at the central exchange, signaling apparatus and circuits at the substation inclosed in a box, switch springs within said box connected with said circuits, a lock for said box, a key for said box, a gear wheel pivoted at the interior of the body portion of the key, an energizing spring associated with said gear wheel, a break wheel connected with said gear wheel to be driven thereby, a contact spring for said break wheel, a contact plug extending from the body portion of the key, a tip contact for said plug connected with said contact spring, a sleeve contact for said plug having electrical connection with the break wheel, a rotatable sleeve extending from the body portion and surrounding said plug, a pinion secured to the lower end of said

sleeve and normally meshing with said gear wheel, a key tongue extending from said sleeve, the insertion of the key within the key hole of the lock of the box causing connection of said plug contacts with the switch springs within the box whereby said make-and-break mechanism within the key is connected with the main circuit, means upon rotation of the key body with respect to the sleeve causing rotation of said pinion and gear wheel to energize said driving spring, pawl and ratchet mechanism within the key body for preventing rotation of the break wheel upon such forward rotation of the driving wheel, the simultaneous rotation of the body and sleeve of the key causing said sleeve to be moved to withdraw the pinion from engagement with the gear wheel whereby said driving spring may cause reverse rotation of the gear wheel, said ratchet mechanism causing rotation of the break wheel upon such reverse rotation of the gear wheel, the operation of the make-and-break mechanism causing change in the conditions of the circuit whereby the receiving apparatus at the central exchange is actuated.

13. In an alarm system, the combination with a main circuit extending from a central exchange to a substation, of signal receiving apparatus at the central exchange, switching apparatus at the substation through which said main circuit is normally continuous, a box containing said switching mechanism, a lock for said box, a key for said lock, make-and-break mechanism within the body part of said key, connecting plug contacts having connection with said make-and-break mechanism, an actuating tongue for said key, and normally ineffective resistance in the circuit the insertion of said key within the lock of the box causing connection of the plug contacts with said switch springs, the actuation of said key to open said box causing operation of the make-and-break mechanism within the key whereby said resistance is repeatedly caused to be effective, thereby causing flow of signaling current through the main circuit for actuating the receiving apparatus at the central exchange.

14. In an alarm system, the combination with a main circuit extending from a central exchange to a substation, of signal receiving apparatus at the central exchange, substation apparatus inclosed in a box and including a switch through which said main circuit is normally continuous, a key for said box, a driving gear wheel within the body part of said key, a driving spring for said driving gear, a break wheel within the body portion having connection with said driving gear, a contact spring for said break wheel, a connecting plug extending from the body portion, a tip contact for said plug connected with the contact spring, a sleeve contact for

said plug connected with the break wheel, a sleeve extending from the body portion and surrounding said plug, said sleeve being adapted for rotatable and longitudinal movement on said plug, a tongue extending from the upper end of said sleeve, a pinion secured to the lower end of the sleeve, a spring for normally retaining said pinion in mesh with the driving gear, the insertion of the key within the lock causing connection of the plug contacts with the switch in the box whereby said make-and-break mechanism is included in the main circuit, the rotation of the body part relative to the sleeve causing forward rotation of the driving gear and energization of the driving spring, pawl and ratchet mechanism for preventing rotation of the break wheel upon such forward rotation of the driving gear, means upon simultaneous rotation of the body and sleeve of the key for causing longitudinal motion of said sleeve whereby said pinion is withdrawn from driving engagement with the driving gear, said pawl and ratchet mechanism causing rotation of the break wheel upon reversed rotation of the driving gear by the driving spring, the operation of said make-and-break mechanism causing repeated changes in the circuit conditions whereby the receiving apparatus in the central exchange is actuated.

15. In an alarm system, the combination with a main circuit extending from a central exchange and connected with a plurality of substations, signal receiving apparatus at the central exchange, signaling apparatus at each substation inclosed in a box, a lock for each box, said locks being similar, and keys for said locks and different signal producing mechanism for each key included in a unitary structure therewith, the insertion of any key in the lock of any of the substations causing electrical connection of the signal producing mechanism of the key with the main circuit, and the actuation of the key to open the box causing the particular signal controlled by the signal mechanism therein to be impressed on the main circuit to be received by the receiving apparatus at the central exchange.

16. In an alarm system, the combination with a main line leading from a central exchange, of substation apparatus and circuits connected therewith, a source of current, the substation apparatus being inclosed in a box provided with a lock and key mechanism, said key mechanism being normally entirely mechanically and electrically disconnected from the substation apparatus and box, the insertion of said key mechanism in the lock causing electrical connection thereof with substation apparatus and circuits, and the actuation of the key after insertion thereof causing change in the circuit conditions whereby current will flow

through the line and central exchange connected therewith.

17. In an alarm system, the combination with a main line leading from a central exchange to a substation, of signaling apparatus at the substation inclosed in a box provided with a lock, key mechanism normally electrically and mechanically disconnected from the box and inclosed apparatus, circuit changing mechanism for the key mechanism adapted upon insertion of the key within the lock to be electrically associated with the substation apparatus, the actuation of the key mechanism to open the lock causing operation of the circuit changing mechanism to change the conditions of the substation circuits and line to cause the transmission of signals to the central exchange, and a source for providing signaling current.

18. The combination with signaling apparatus, of an inclosing box therefor provided with a lock, a key for the box normally entirely disconnected therefrom, the insertion of the key within the lock causing inclusion of the key in circuit with inclosed apparatus, and the actuation of the key to open the lock causing changes in conditions of the circuits connecting the apparatus.

19. The combination with signaling apparatus, of an inclosing box therefor provided with a lock, a key mechanism normally electrically and mechanically disconnected from the box and inclosing apparatus, circuit changing apparatus associated with the key mechanism, the insertion of the key mechanism in the lock causing continuation through the circuit changing mechanism of circuits connecting the inclosed apparatus, and the actuation of the key mechanism to

open the locks causing operation of the circuit changing mechanism to change the conditions of the circuits connecting the apparatus.

20. The combination with signaling apparatus, of an inclosing box therefor provided with a lock, a key normally entirely disconnected from the box and apparatus, the insertion of the key within the lock causing connection thereof with the apparatus through circuits including said key, the actuation of the key to open the box causing changes in the circuit conditions.

21. The combination with signaling apparatus, of an inclosing box therefor provided with a lock and key mechanism normally entirely disconnected from the box and apparatus, a circuit connecting said apparatus being normally continuous in the box, the connection of the key with the lock causing said key mechanism to be connected serially in said circuit.

22. The combination with signaling apparatus, of an inclosing box therefor provided with a lock and key mechanism normally entirely disconnected from the box and apparatus, a circuit connecting said apparatus being normally continuous in the box, the connection of the key with the lock causing said key mechanism to be connected serially in said circuit, the actuation of the key mechanism to open the box causing said circuit to be repeatedly changed.

In witness whereof, I have hereunto subscribed my name this 29th day of November A. D., 1904.

GARRISON BABCOCK.

Witnesses:

C. N. QUINBY,
GEO. S. McMILLAN.