F. B. WOOD.

ELECTRIC SIGNAL SYSTEM.

APPLICATION FILED JULY 6, 1908.

983,191.

Patented Jan. 31, 1911.

2 SHEETS—SHEET 1.

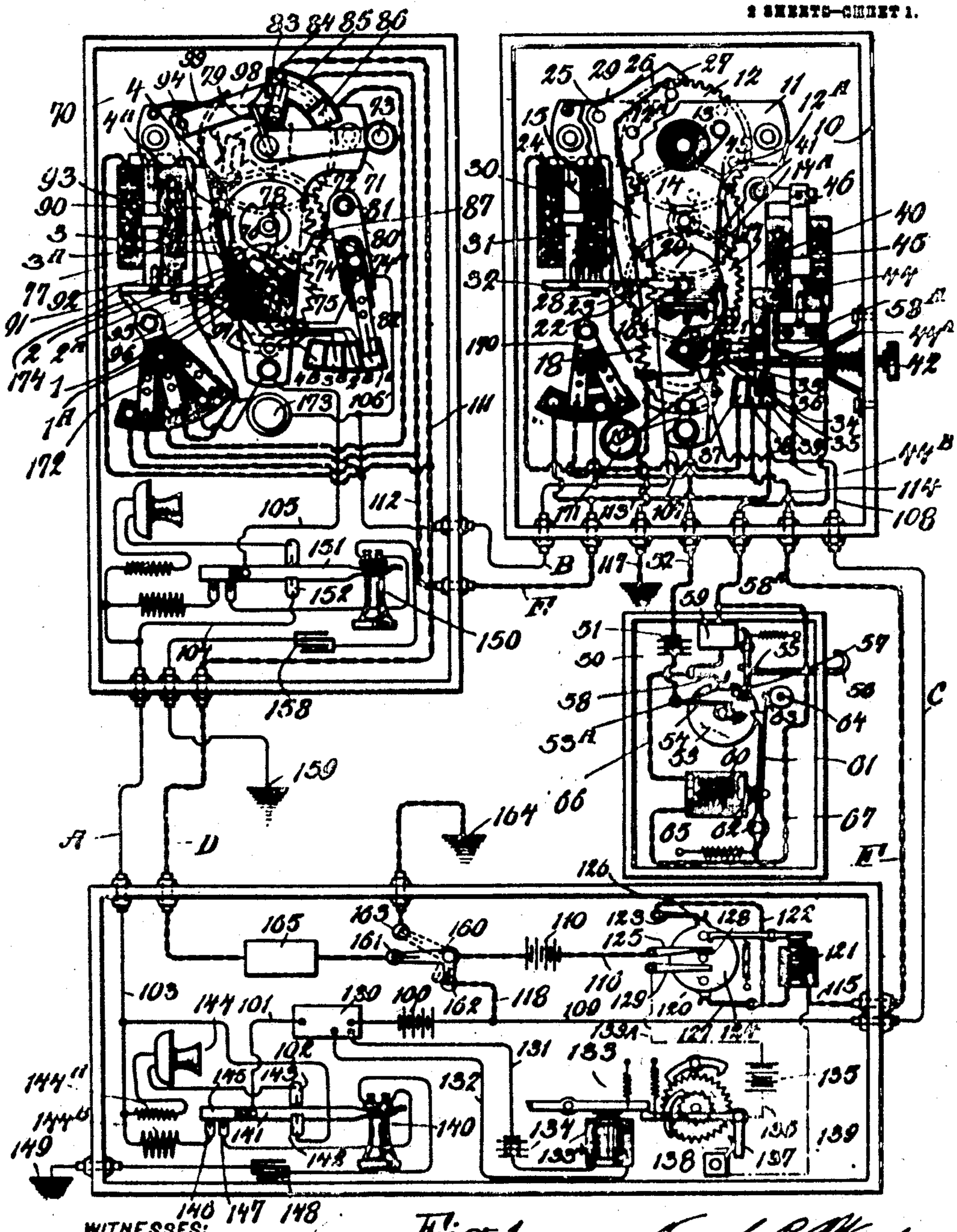

Fig. 1.

WITNESSES:

William L. Ewell

Frank B. Wood

BY

E. W. Marshall

ATTORNEY

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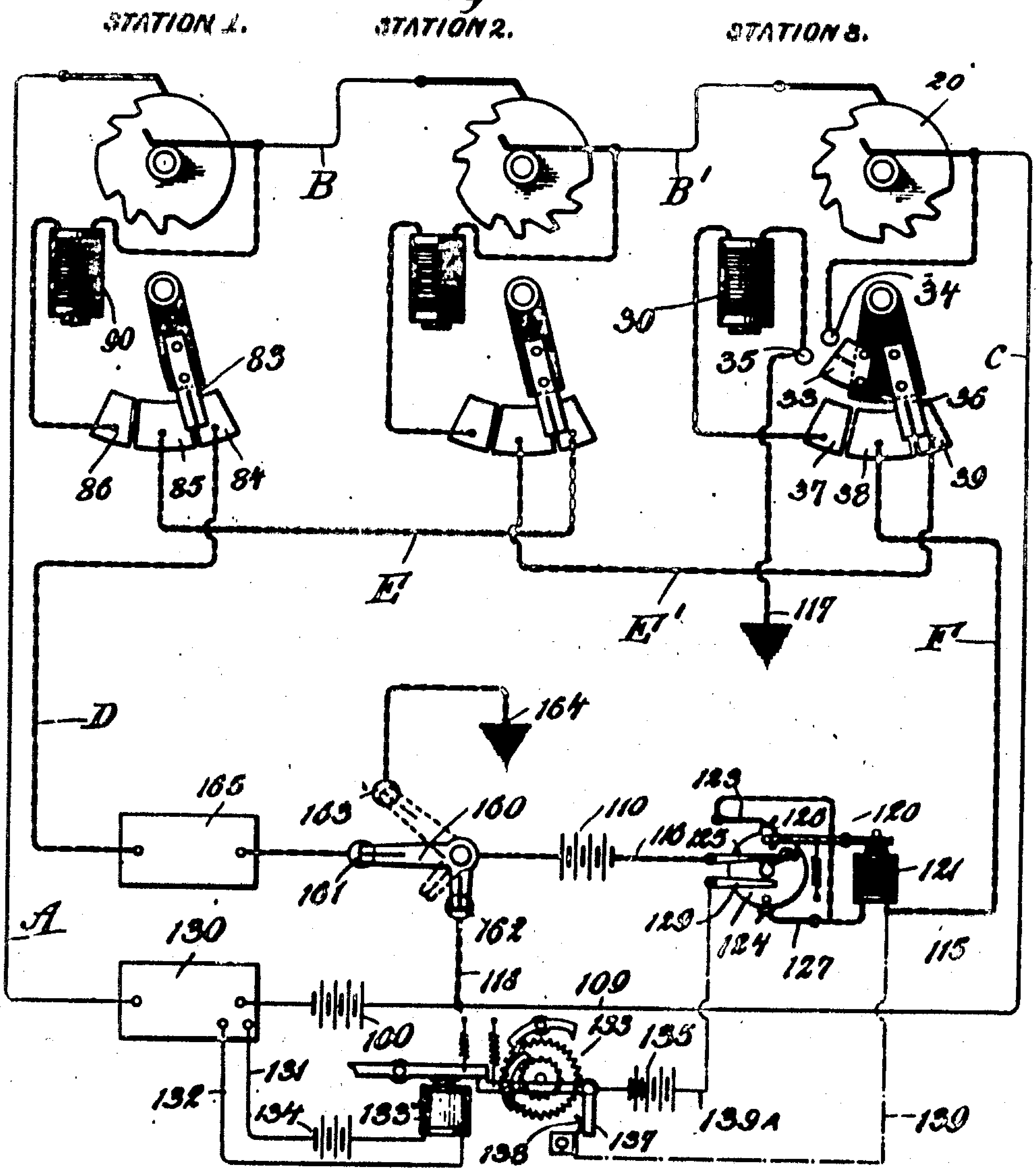
2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:
William P. Gleason
[signature]

INVENTOR
Frank B. Wood
BY
E. W. Marshall
ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK B. WOOD, OF NEW YORK, N. Y.

ELECTRIC SIGNAL SYSTEM.

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To all whom it may concern:

Be it known that I, FRANK B. WOOD, a citizen of the United States, and a resident of the city, county, and State of New York, United States of America, have invented certain new and useful Improvements in Electric Signal Systems, of which the following is a specification.

My invention relates to improvements in electric signal systems such as are commonly used for fire alarm, telegraph, or police signal service, and its object is to improve upon apparatus and circuits used in such systems and to provide a simple apparatus and connecting circuits by means of which an efficient and reliable service may be attained.

To these ends my invention resides in the construction and arrangement of parts described in the following specification, the novel features of which are set forth in claims.

Referring to the drawings, Figure 1 is a diagrammatic representation of my invention. In this figure the receiving apparatus, such as may be installed in a central station, is shown electrically connected with a fire alarm box and an auxiliary fire station, and with a police call station. Fig. 2 is a diagram of circuits and certain parts of the apparatus with only so much of the latter shown as is necessary to illustrate the operation of my invention.

Like characters of reference designate corresponding parts in both of the figures.

10 designates the casing of a fire alarm box within which a metallic frame 11 is located, which, near its upper portion, pivotally supports a spur-gear 12, from the face of which a series of pins 12^A project. The gear 12 is arranged to be driven by a coiled spring 13.

14 is a pinion in mesh with the gear 12 and carries an arm 14^A which is arranged to rotate with the pinion for a purpose which will appear hereinafter. Another spur-gear 15, mounted upon the same arbor with the pinion 14, is arranged to transmit motion to another pinion not shown which is rigidly mounted upon an arbor 16. A gear-wheel 17, also mounted upon the arbor 16, actuates an escapement wheel 18 and an escapement latch 19. A signal disk 20 is also secured to the arbor 16. An insulated contact finger 21, coacting with this disk, is arranged to make and break an electric circuit in the usual manner whenever the disk is rotated. In the drawings, the disk and finger are arranged for a closed circuit system, and the signal number for which they are constructed is 43. The parts above described are normally held from rotation by means of a finger 22 which is affixed to the arbor 16 and which rests upon a pin 23 projecting from the lower end of a lever 24 which is pivoted at 25 in the frame 11. An arm 26, which is an integral part of lever 25, extends above and to the right of this pivot and terminates in a hook or shoulder 27 which is adjacent to the path of movement of the pins 12^A. The lower end of lever 24 is made with a lateral projection 28.

30 designates an unlocking solenoid supported upon the frame 11. To the lower end of its core 31 is a horizontal arm 32 which normally rests against the latter projection 28 on the lower end of lever 24 in such a way as to hold the pin in the path of the arm 22 and thus maintain the mechanism at rest. The winding of solenoid 30 is included in a normally open circuit under control of a switch which comprises a movable contact 33 insulated from but mounted upon the side of a switch-arm 40 which is pivoted at 41 and which is arranged to be moved into such a position as to bridge two stationary contacts 34 and 35. The pivoted switch-arm 40 is also provided with a depending contact finger 36 which is arranged to be moved over stationary insulated contact plates 37, 38 and 39.

42 is a push-rod projecting through the side of the box 10 and spring-pressed outward. By means of this push-rod the pivoted arm 40 may be manually shifted to cause the contact plate 33 to bridge contacts 34 and 35 and at the same time move the contact finger 36 into such a position that it will bridge contacts 37 and 38. A circuit supplied by a battery 110 at the central station will be closed thereby through the winding of solenoid 30. The energization of this solenoid will cause it to raise its core 31 and to move the arm 32 out of engagement with the shoulder 28 on the pivoted releasing lever 24 so that a spring 29 which is in engagement with the lever will push it over until the pin 23 is removed from the path of movement of the arm 22. The signal mechanism above described is unlocked thereby and rotated by the spring 13 so that the make and break devices will transmit the desired signal to the central office over a cir-

cuit which I will specifically point out hereinafter. The movement of the unlocking lever will cause its end 27 to be moved into the path of movement of the pins 12^A on the wheel 12.

The rotary signal mechanism is so arranged that after the signal disk 20 has completed four revolutions, the arm 14^A will engage with an inclined shoulder 43 on switch-arm 40 and will return this arm to its normal position, thus breaking the circuit through solenoid 30 and bringing the contact finger 36 to its original position to bridge stationary contacts 38 and 39. This will at the same time cause the core 31 and its connected parts to drop back into locking position to prevent further rotation of the signal disk.

In connection with the manual operation above described, it is often desirable to use in conjunction with such a signal-box one or more auxiliary stations such as 50, which may be electrically connected with the master-box or station. The electrical actuating mechanism in the box 10 comprises a solenoid 44 which, when energized, will pull down its core 45, which is connected at 46 with the pivoted switch-arm 40, in such a manner that this downward movement of the core will shift the switch-arm 40 into the same position and will cause it to perform the same functions as would be accomplished by manually pushing it over by means of the push-rod 42.

A battery 51 is provided at the auxiliary station and this is connected by a wire 52 with the master-box. The mechanism in the auxiliary station box comprises a wound-up spring (not shown), which is arranged to rotate a disk 53, which disk is connected with the other terminal of the battery 51 by a contact finger 54. The disk 53 is set in motion whenever the locking lever 55 is pulled back by the hook 56 out of engagement with the pin 57 upon the disk. 58 is a contact finger adapted to engage with the periphery of the disk 53 when the latter is rotated, and this is connected through a buzzer 59 by a wire 58^A with one of the terminals of the switch-arm actuating solenoid 44. A notch or depression 53^A in the disk 53, directly below the contact finger 58, leaves this circuit open at this point.

60 designates an electromagnet which is arranged to act upon and to pull over a lever 61 which is pivoted at 62 until the upper end thereof is in the path of movement of the pin 57.

63 is a hammer connected with the upper portion of lever 61 and adapted to strike against a bell 64 whenever the lever 61 is pulled back by spring 65.

When the disk 53 rotates, it closes a circuit from battery 51, disk 53, contact finger 58, through buzzer 59, conductor 58^A, solenoid 44, out through conductor 44^A, which is connected at 44^B with the signal circuit 108 which is connected with the finger 21 and through the signal disk 20 and the wire 52 back to the other terminal of battery 51. A second circuit is also closed in the auxiliary box as follows: From battery 51, through contact finger 58, conductor 66, winding of magnet 60, and conductor 67 to the box 10, and through the solenoid 44 and signal disk 20 back to battery 51 by conductor 52. If the circuits are in proper order the magnet 44 will be energized and the buzzer 59 will be put into action to indicate this fact. The second circuit which goes through the magnets 60 and 44 will continue to energize them until the signal is sent in from the signal disk 20 in the master-box. If the other circuits are in such condition as to lock the signal mechanism within box 10 in a manner which I will later describe, the upper end of pivoted lever 61 engaging with the pin 57 will hold disk 53 from further rotation and thus hold the two circuits of the auxiliary station closed until such time as the signal is sent in by the mechanism within the box 10. When the signal circuit is intermittently broken at the signal disk 20, the signal will be repeated within the auxiliary box because the magnet 60 will be intermittently deënergized and will thus allow the spring 65 to pull the hammer 63 over against the bell 64, and this will also stop the buzzer intermittently. As soon as the circuit through the magnet 60 is first broken, it will allow the disk 53 to complete its rotation until the pin 57 is again engaged by the locking lever 55. The actuating mechanism which I have not shown, as it is well understood and forms no part of the present invention, should be so arranged that the rotation of the disk 53 should not be completed in less time than it takes for the disk 20 to send in its signal, in order that the complete signal may be received within the auxiliary box 50. Should another box be sending in its signal, the mechanism within the auxiliary box will be held in check, and the buzzer constantly going until the box is allowed to take the line. It is evident that any number of these auxiliary boxes may be connected with every master-station such as that represented.

In the upper left-hand portion of Fig. 1 is a representation of another form of signal station, in this case an apparatus which may be advantageously used for a police call-box. In this portion of the drawing 70 designates the inclosing box within which is a supporting frame 71. A spring-actuated gear-wheel 72 is pivoted in this frame, the spring for which is not shown but which is arranged to be wound up and actuated by a ratchet and pawl mechanism through the medium of a handle 73. The gear-wheel 72 is ar-

ranged, through an intermediate pinion which is not shown, to drive a gear-wheel 74 which transmits its motion to an escapement wheel 75 which is provided for the purpose of preventing too rapid rotation of the actuating mechanism. 76 and 77 are make and break signal disks connected to rotate with gear-wheel 74. A spring contact finger 78 coöperates with the smaller disk 76. The disk 77 is provided with a desired number of teeth for the purpose of sending to the central office the signal of this particular station. Besides the teeth corresponding with the signal of the box, the disk 77 is provided with teeth 1, 2, 3 and 4 with which contact fingers 1^A, 2^A, 3^A, and 4^A coöperate, respectively, to effect the sending of certain calls such, for example, as "report call," "telephone call," "ambulance call," and "wagon call." For the purpose of selecting and controlling these several calls a switch-arm 80 is provided. This is pivoted at 81 and carries an insulated contact finger 82 which may be moved onto any one of four stationary contacts 1^B, 2^B, 3^B, and 4^B, which are electrically connected with the contact fingers 1^A, 2^A, 3^A, and 4^A, respectively. The contact finger 78, which coöperates with the disk 76, and the contact finger 82 are connected with the line wire 106 of the signaling circuit. The use of the disk 76 and the contact finger 78, arranged as above described, is important for insuring the transmission of the desired signal. The contact finger 82 is normally in contact with stationary contact 1^B which may be in the "report call" circuit, so that when the box is operated from the outside, this call will be sent. The switch-arm 80 is preferably inside of the box where it is accessible only to a policeman or some other person having a key thereto. This signal will, with the parts arranged in the positions shown, be two short and three short breaks, thus: -- ---, indicating "twenty-three," the number of this particular box. When the disk 77 moves around until the spaces between teeth 4, 3, 2 and 1 pass the brush 1^A, the disk 76 will be in contact with brush 78 so that a circuit will be closed at this point, and these breaks in disk 77 will have no effect upon the signal. Now, when the contact finger 82 is moved over onto contact 2^B, the brush 2^A will be connected with the signal circuit so that when the signal disks are rotated the signal which now may indicate a "telephone call" will be one long break followed by two short and three short breaks, thus: — -- ---, this meaning a telephone call from box twenty-three. The disk 76 and brush 78 will close that part of the signal disk signal which would otherwise be sent in by the spaces between teeth 2, 3 and 4 on disk 77 passing brush 2^A. Similarly, an "ambulance call" or a "wagon call" represented by two long breaks followed by two short and three short breaks, thus: --- -- -- ---, and by three long breaks followed by two short breaks and three short breaks, thus: --- — -- - - ---, may be sent in by moving contact finger 82 either onto stationary contact 3^B or stationary contact 4^B, as desired. In either case the disk 76 and brush 78 coact with signal disk 77, in the manner above described, to send in the proper signal. In this simple manner one signal disk may be made to send in four or more different signals. This police signal box is provided with an unlocking solenoid 90, the armature or core of which is provided with an arm 91 normally depressed by a spring 92. A lever 93, pivoted in the frame 71 at 94, is provided at its lower end with a lateral projection with a shoulder 95 which normally bears against the arm 91. A pin 96 projects from lever 93 and is normally disposed in the path of a finger 97 secured to the escapement arbor of the motor. This locking means is therefore substantially the same as that hereinbefore described in conjunction with the fire alarm mechanism. The upper end of lever 93 is provided with a lateral arm 98 which is provided with a shoulder at its free end. A spring 99 presses the shouldered arm of the arm 98 toward the end of a pin 79 projecting from the end of handle 73 and also serves to hold the shoulder 95 back against the end of arm 91. A contact finger 83 is connected with but insulated from the operating handle 73 and is arranged to cooperate with insulated stationary contacts 84, 85 and 86.

As shown in the drawing, the mechanism of the police call box is locked. Whenever the magnet 90 is energized by a manipulation of the circuits as hereinafter described, the arm 91 will be raised and this will release the lever 93, and the latter when the operating handle 73 has been depressed, will swing on its pivotal support to carry the pin 96 out of the path of the finger 97. The signaling mechanism will now be free to operate to transmit a signal to the central office. As the operating handle 73 is returned to its normal position, the pin 79 will engage with the arm 98 to return it to the position in which it is shown in Fig. 1. If the switch-arm 80 has been moved for the purpose of sending a special signal, it will be returned to its normal position, with contact finger 82 resting upon stationary contact 1^B, by the engagement of a pin 74^A on gear-wheel 74 with a lug 87 on the switch lever.

The system which is part of the present invention and in which my improved apparatus is employed, comprises two principal circuits, one of which, shown in the drawings by light solid lines, I call the signaling circuit, and the other which is indicated by

heavier broken lines may be called the controlling circuit. At the central station a battery 100 is provided for the signaling circuit, and a battery 110 for the controlling circuit. A controller 120, a register 133, and a telephone 140 may also be provided here.

I will now trace the various circuits and point out the operation of the system. The signal circuit in the present instance is a closed circuit beginning at the battery 100, through a relay 130, by wire 101 to telephone arm 141, contact finger 142, wires 102 and 103, to and through wire A which extends to the first signal box, in this case the police signal box. Thence by wire 104 the circuit extends to contact finger 152 which is in contact with arm 151 of telephone 150 within the police signal box. A wire 105 connects this arm with the frame 71, and through the latter to the signal disks 76 and 77, and through the various contact fingers resting thereon, by the wire 106 to wire B, by means of which the signal circuit is continued to the next box on the line, which, in this case, is the fire-alarm box 10. The wire 107 connects the circuit with the metallic frame 11 and continues through the latter, signal disk 20 and brush 21 to wire 108 which is connected to the wire C. By means of wire C the circuit returns to the central station and is completed by wire 109 which connects wire C with the battery 100.

131 and 132 are conductors which connect the relay 130 with a registering apparatus 133 which is controlled by the relay 130 and operated by a local battery 134 in the usual manner.

When the telephone receiver 140 at the central station is lifted, the arm 141 will make contact with finger 143 before breaking contact with finger 142. Thus the transmitter 144 is thrown into the circuit without disturbing the signal circuit. The rear end 145 of arm 141 is insulated from the rest of the arm and is arranged to be moved into contact with fingers 146 and 147 to connect one end of the telephone receiver with the signal line. The other end of the receiver is connected through a condenser 148 with the ground at 149. 144^A and 144^B designate the primary and secondary windings of an induction coil. Similar parts of the telephonic apparatus are shown in the police signal box which may, in the above described manner, be thrown into the signal wire circuit and grounded at 159 through a condenser 158. Thus the two telephones are connected together through the signaling mechanism in the boxes and through the signal circuit without breaking the latter. The arrangement shown for connecting the receivers with the ground through condensers further prevents disturbance of the battery current through the signal circuit. The second or controlling circuit which may also be called the unlocking circuit is energized by a battery 110 at the central station. It is a normally closed circuit which passes through a switch 160 and contact 161 to a high resistance relay 165. Thence it runs by a wire D to the police signal box, in which it is connected by wire 111 with contact plate 84. This plate is connected by brush 85 with plate 85, and a wire 112 connects this latter plate with a wire E which runs to the fire alarm box. Within the fire alarm box the circuit continues by wire 113, contact plates 39 and 38 which are bridged by contact brush or finger 36, and out by wire 114. Wire F carries the circuit back to central station where it is completed through wire 115, magnet 121 of a controller 120, wire 122, finger 123, wheel 124, finger 125, and wire 116 to the battery.

When the mechanism at a station is operated to transmit a signal to central office, the various mechanisms will be controlled by a combination of the circuits which I have above described. Before the box has been set for operation the releasing solenoid 30 is entirely cut off from the rest of the system, as one of its terminals is connected with a dead contact plate 37 and its other terminal is connected with another dead contact plate 34 and with the ground by conductor 117. When the box is set for operation, the switch-arm 40 is moved to the left so that the finger 36 is moved off from stationary contact 39 and into position to bridge contacts 38 and 37. At the same time stationary contact 34 is connected by contact blade 33 with stationary contact 35 which is connected with the wire 108 of the signal circuit. Thus the wires 113 and E, which connected this box with the station beyond it, are disconnected and a circuit is formed of parts of the signal circuit and the controlling circuit which includes the releasing solenoid 30 of the first fire alarm station. This circuit from battery 110 extends through switch 160 and its contact 162, wires 118, 109, C, 108, contacts 34 and 35 which are bridged by contact 33, to and through magnet 30, contacts 37 and 38, which are bridged by contact 36, wires F and 115, through controller 120, and by wire 116 back to the battery.

The switch 160 is provided so that if a break should occur in the signal line, the person in charge of the central office may by moving this switch into the position indicated by dotted lines, unlock any box or boxes beyond the break which may have been pulled, so that the latter will not subsequently send in its signal at such time as the break is repaired which would obviously be too late to be of any use. The break in the signal line would be indicated by the

relay 130 and the register 133 and if any box has been pulled on the line since the break occurred, this fact will be shown by the actuation of the controller 120 as soon as switch 160 is thrown over.

The solenoid 30 and the magnet 121 in the controller at the central station are arranged to act simultaneously, so that the solenoid 30 will release the signaling mechanism of the first fire alarm box and at the same time the magnet 121 will cause the controller to be actuated to break the controlling circuit. This is accomplished by the rotation of the disk 124 by some suitable means which, when released by the magnet 121 and its associated parts, will make half a revolution, thereby carrying lug 126 away from finger 123 and bringing it into the position shown in dotted lines in which it is in contact with finger 127, and carrying lug 128 away from finger 125 and into contact with finger 129. This will connect the controller 120 and the register 133 together.

The resistance of relay 165 in the controlling circuit is so great that the controller magnet 121 will not actuate its associated parts until the controlling circuit beyond any station is broken, thus cutting the relay 165 out of the circuit. This relay 165 would also give notice of any break in the line through its back contacts which are not shown in the drawings but is well known in the art.

After the signal from a given station has been sent in over the first or signaling circuit, the controlling circuit is automatically restored and the controller 120 at the central station brought back to its normal condition. This result is attained by the following circuit and arrangement of parts. Beginning at a local battery 135 the circuit goes through wire 136, arm 137, contact 138, wire 139, through magnet 121, to finger 127, which, of course, cannot close the circuit before the lug 126 registers it; then by finger 129 and wire 139[A] back to battery 135. While the register 133 is operating magnet 133[A] keeps the arm 137 away from contact 138, thus keeping the above local circuit open until the register has completed its operation. As soon as the above local circuit is closed through magnet 121 the controller will be released thereby and will make another half revolution, thus returning the parts to their original positions and restoring the controlling circuit throughout the system.

The mechanism of the recorder 133 is well known and, as usual, is provided with an escapement device or other retarder which prevents the closing of arm 137 against contact 138 until the register mechanism has come to rest.

In Fig. 2 the essential parts of the police signal box which has the signal 23 are shown as "station 1." The essential parts of fire alarm box signal 43 are shown as "station 3." Intermediate these two stations is another fire alarm signal box, signal 34, shown as "station 2." The circuits which I have heretofore pointed out may be readily traced and their operation seen from this figure. Whenever the actuating switch of any box is moved to energize its releasing magnet, such movement at once cuts off the controlling circuit or releasing current from all succeeding signal boxes on the line, and the controller at the central station also opens the circuit of the controlling line until the signal is received and the recorder again comes to rest. Then, if one or more of the other boxes on a line have been "pulled" or set for operation, the one of these which is nearest the central station will take the signal circuit and send in its signal. It is, therefore, possible to connect an unlimited number of boxes on one line and they will be absolutely non-interfering. For example, if there were one hundred signal boxes on one line and all were pulled at exactly the same time, the one nearest the central station would send in its signal and the others would remain locked until the first had completed its operation. The next nearest box to central station would then take the line and send in its signal, &c. If, during the sending of a signal from one of the boxes another box nearer central station should be pulled, this would not interfere with the signal which was being sent, but after the completion of such signal, the latter signal box would take the line and send in its signal followed in turn by the other signal boxes which had been set for operation.

Referring again to Fig. 1, 170 designates a testing switch within box 10 which, when moved to the left, connects a bell 171 in parallel with that portion of the signal circuit which includes the signal disk 20, and shunts the unlocking circuit past the releasing solenoid 30. The signal circuit may then be released by manually raising the arm 32. The signal actuating mechanism may thus be tested and its signal audibly heard at the bell 171 without affecting the other apparatus in the signal circuit.

172 designates a somewhat similar testing switch within the police testing box 70. This switch connects a bell 173 into the signal line and at the same time, by means of its arm 174, pushes the core of releasing magnet 60, upward so that the signal mechanism is set into operation. It may be seen that the movement of the switch 172 will at the same time short-circuit the connections of the controlling or unlocking circuit within the signal police box.

What I claim is.—

1. In a signal system, the combination

with a series of signal transmitting mechanisms, locking devices for the transmitting mechanisms, an unlocking magnet for each of the transmitting mechanisms, an unlocking circuit, and means for operatively including but one of said electromagnets in the unlocking circuit at a time.

2. In a signal system, the combination with a signal transmitting mechanism, a locking device therefor, and a signal-receiving mechanism; of a signal circuit including the transmitting mechanism and controlling the signal-receiving mechanism, a second circuit for said locking device, and means energized by the connection of one of said circuits with the other for effecting the release of said locking device and the operation of the signal transmitting mechanism.

3. In a signaling system, the combination with a series of signal transmitting mechanisms, and a locking device for each, of a signal circuit including the transmitting mechanism, a receiver controlled by said circuit, a second circuit for said locking devices, an electrical bridge connection between the signal circuit and the second circuit, means for utilizing parts of said signal and unlocking circuits to actuate the locking devices, and means for holding the unlocking circuit open while one of said transmitting mechanisms is transmitting a signal through the signal circuit.

4. In a signaling system, the combination with a series of signal transmitting mechanisms, locking devices for each, and a receiving mechanism, of a signal circuit including said signal transmitting mechanisms and a central office battery, a relay for the receiver also included in said circuit, a second or unlocking circuit for the locking devices, a resistance device and a battery included in said second circuit and a bridge circuit between the first-mentioned circuit and said second circuit, at a point between the battery and the resistance device in the second circuit.

5. In a signaling system, the combination with a series of signal transmitting mechanisms, a locking device for each, and receiving mechanism, of a signal circuit including the transmitting mechanisms, a second circuit normally shunting the locking devices, a battery in each circuit, means for including the locking devices in parts of both circuits for operating the locking devices to unlock the transmitting mechanism, means for releasing one of said transmitting mechanisms at a time and means for opening said second circuit during the operation of the released transmitting mechanism.

6. In a signaling system, the combination with a series of signal transmitting mechanisms and a central office receiver or register, of a signal circuit normally including said signaling mechanisms, a relay in said circuit controlling a local circuit including the receiver or register, a locking device for each transmitting mechanism, a magnet for operating each locking device, a second circuit including a battery at the central office and normally shunting the locking magnets, a switch at each signal station for shifting the said second circuit through the lock magnet and a portion of the signal circuit, a resistance device included in said second circuit, and a bridge circuit connecting the signal circuit and said second circuit, at a point between the battery and resistance device in the second circuit.

7. In a signaling system, the combination with a series of signal stations and a central office, of signaling mechanism at each station, a lock device for each signaling mechanism, actuating means for each lock device, a receiver at the central office, a signal circuit including said signaling mechanisms and controlling the receiver, a second circuit passing through said stations, a controller in said second circuit, means for connecting said second circuit with the signal circuit and the actuating means of the lock devices.

8. In a signaling system, the combination with a series of stations each having a signaling mechanism, a locking device normally locking the signaling mechanism, and actuating means for the lock device, a signal circuit including said signaling mechanisms and a battery, a second circuit including a battery and extending through said stations, means for shifting said second circuit through the actuating means of the lock devices and a controller in said second circuit.

9. In a signaling system, the combination with a series of signaling mechanisms, each having a lock device and actuating means therefor, of a signal circuit including the signal mechanisms, a normally closed unlocking circuit connected with said signaling mechanisms, a resistance device in said unlocking circuit, and means for short-circuiting the resistance device at any of the signaling mechanisms.

10. In a signaling system, the combination with a series of signal stations and a central office, of signaling mechanism at each station, a lock device for each signaling mechanism, actuating means for each lock device, a receiver at the central office, a signal circuit including said signaling mechanisms and controlling the receiver, a second circuit passing through said stations, a controller in said second circuit, means for connecting said second circuit with the signal circuit and the actuating means of the lock devices, and a bridge connecting said signal circuit and said second circuit at the central office.

11. In a signaling system, the combination with a series of signaling mechanisms, each

having a lock device and actuating means for said lock device, of a signal circuit including the signaling mechanisms, a second normally closed circuit, a resistance device and a controller in said second circuit, a bridge circuit for short-circuiting said resistance device, and means for connecting a portion of the signal circuit with the second circuit and the actuating means of the lock devices.

12. In a signaling system, the combination with a series of stations and a central office, of a signaling mechanism at each station, a receiver at the central office, a signal circuit including said signal mechanisms, a lock device for each signal mechanism, actuating means for each lock device, a second circuit including the central office and each of said stations, a resistance device in said central office, a bridge at the central office connecting said circuits, a resistance device in said second circuit at one side of said bridge, means at each station for connecting parts of the signal circuit and second circuit in series with each other and with the actuating means of the lock devices, and a controller in said second circuit for opening the second circuit when the lock devices are operated.

13. In a signaling system, the combination with two circuits, each normally independent of the other, signaling devices included in one of said circuits, a lock device for each of said signaling mechanisms, actuating means for each lock device, means for including portions of said circuits in series with each other and the actuating means of the lock devices, and means for opening one of said first-mentioned circuits and permitting the transmission of a signal over the other.

14. In a signaling system, the combination with two normally independent circuits of signaling mechanisms included in the first circuit, a battery in each circuit, a resistance and an electromagnetic circuit breaker having a magnet of relatively low resistance, in the second circuit, a bridge connecting said circuits between the resistance and battery in the second circuit, lock devices for the signaling mechanisms, actuating means for the lock devices, and means for momentarily including parts of both of said circuits in series with the actuating means of the lock devices.

15. In a signaling system, the combination with two normally independent circuits, of signaling mechanisms in the first of said circuits, a lock device for each signaling mechanism, actuating means for each lock device, means for including portions of both circuits in series with each other and the actuating means of the lock devices, a circuit breaker for opening the second of said first-mentioned circuits when a lock device has been operated and permitting the transmission of a signal over the first circuit, and means for automatically closing the circuit breaker at the conclusion of a signal.

16. In a signaling system, the combination with two normally independent circuits, of signaling mechanism in the first of said circuits, lock devices for said signaling mechanisms, actuating means for the lock devices, a battery, a resistance device and a magnet of relatively low resistance in the second circuit, a normally closed circuit breaker in the second circuit controlled by said magnet, a bridge connecting said circuits between the resistance device and battery of the second circuit, means for including the actuating means of a lock device in series with portions of each of said circuits, shunting the resistance device in the second circuit and permitting the operation of the circuit breaker to open the second circuit, and electrical devices for automatically restoring the circuit breaker to close the second circuit at the conclusion of a signal.

17. In a signaling system, the combination with two normally independent circuits, of signaling devices included in the first of said circuits, lock devices for the signaling devices, a relay also included in said first circuit, a receiver controlled by said relay, a circuit closer controlled by said receiver, a battery, a resistance device, and a magnet of relatively low resistance included in the second circuit, a normally closed circuit breaker included in the second circuit, a bridge connecting said circuits between the resistance device and battery in the second circuit, means for including the actuating means of the lock devices in series with portions of both of said circuits, and a local circuit including a battery, the circuit closer controlled by the receiver and the magnet controlling the circuit breaker on the second circuit for restoring said circuit breaker.

18. In a signaling system, the combination with two normally independent circuits, a signal transmitting mechanism and a battery included in the first of said circuits, a battery and a resistance device included in the second circuit, a switch in the second circuit between the resistance device and battery, a bridge connecting said switch with the first circuit, a lock device for the signal transmitting mechanism, actuating means for the lock devices connected with the second circuit, a ground connection for said second circuit adjacent to the actuating means of said lock device, and a ground connection for the switch when the latter is opened to cut out the resistance device and open the circuit of the bridge wire.

19. In a signaling system, the combination with a signal transmitting mechanism, an electrically operated lock device therefor, a circuit for the electrically operated means

of the lock device, a circuit for the transmitting mechanism, a testing bell, and a manual switch constructed to mechanically operate the lock to release the transmitting mechanism and short-circuit the circuit of the operating means of the lock device and include the test bell in the circuit of the signal transmitting mechanism.

20. In a signaling system, the combination of a signal transmitting apparatus, an electrically controlled locking device therefor, of a central office controller comprising a normally closed circuit closer, means for including said circuit closer in circuit with the controlling means of the lock device, and electrically actuated means in said central office controller for opening said circuit closer, and automatically actuated means for restoring the circuit closer of the controller.

21. In a signaling system, the combination with a signal circuit; signal transmitting means and an electrically actuated locking means therefor and a circuit for said locking means, of a central office controller for controlling the circuit of the electrically actuated locking means, a register at the central office for receiving the signal of the transmitting means and devices controlled by the register for maintaining the circuit including the controller and electrically actuated means open while a signal is being recorded by the register and then automatically causing the said circuits to be closed.

22. In a signaling system, the combination of a series of signal transmitting mechanisms, each comprising a signal disk having a series of teeth, and means for rotating said disk, a series of fingers coöperating with the teeth of said disk, a switch, and a locking device, with a signal circuit including said transmitting mechanisms, and an unlocking circuit for effecting the releasing of said locking devices, said switch being arranged to include any one of said fingers in the signal circuit.

23. In a signaling system, the combination of a series of signal transmitting mechanisms, each comprising a signal disk having a series of teeth, a motor for rotating said disk, a series of fingers coöperating with the teeth of the signal disk, a switch associated with said fingers, a device on the motor for returning said switch to its normal position, and a locking device, with a signal receiving mechanism, a signal circuit including the transmitting mechanism and controlling the signal receiving mechanisms, a second circuit for said locking devices, and means cooperating with both of said circuits for effecting the release of said locking devices and the operation of the signal mechanisms.

24. In a signal system the combination of a signal transmitting mechanism, a motor therefor, a lock device for the motor, and an electroresponsive device for controlling the lock device; a signal circuit including the transmitting mechanism, and an unlocking circuit; a switch for connecting one of said circuits with the other to energize the electroresponsive device, means for operating said switch to connect said circuits to thereby release the motor and the transmitting mechanism, and means actuated by the motor for automatically returning said switch.

25. In a signaling system, the combination of a series of signal transmitting mechanisms, each comprising a signal disk, a motor, a lock device for the motor, an electroresponsive device for controlling said lock device, a switch in the circuit of said electroresponsive device, means for moving said switch to close the circuit of the electroresponsive device, a shoulder on the arm of said switch, and an arm moved by the motor to engage said shoulder to thereby return the switch; with a signal receiving mechanism, a signal circuit including the transmitting mechanisms and controlling the signal receiving mechanism, a second circuit for said electroresponsive devices, and means coöperating with both of said circuits for effecting the release of said locking devices and the operation of the signal transmitting mechanisms.

26. In a signaling system, the combination with a series of transmitting mechanisms and locking means therefor, of a signal circuit, and a second circuit for controlling the locking means, a testing switch for each transmitting mechanism, and means on said testing switch for mechanically operating the locking means to release the transmitting mechanism and for short-circuiting the second circuit.

27. In a signaling system, the combination with a series of signal transmitting mechanisms, of a signal circuit including said transmitting mechanisms, locking devices for the transmitting mechanisms, an unlocking electromagnet for each of the transmitting mechanisms, a local ground circuit for each of said magnets, an unlocking circuit, and means for momentarily energizing but one of said electromagnets at a time by the connection of one of said circuits with the other.

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

FRANK B. WOOD.

Witnesses:
WILLIAM F. GEARNS,
ERNEST W. MARSHALL.