(No Model.)

2 Sheets—Sheet 1.

J. SACHS.

ELECTRIC SIGNAL FOR FIRE ALARM SYSTEMS.

No. 502,207. Patented July 25, 1893.

Fig. 1.

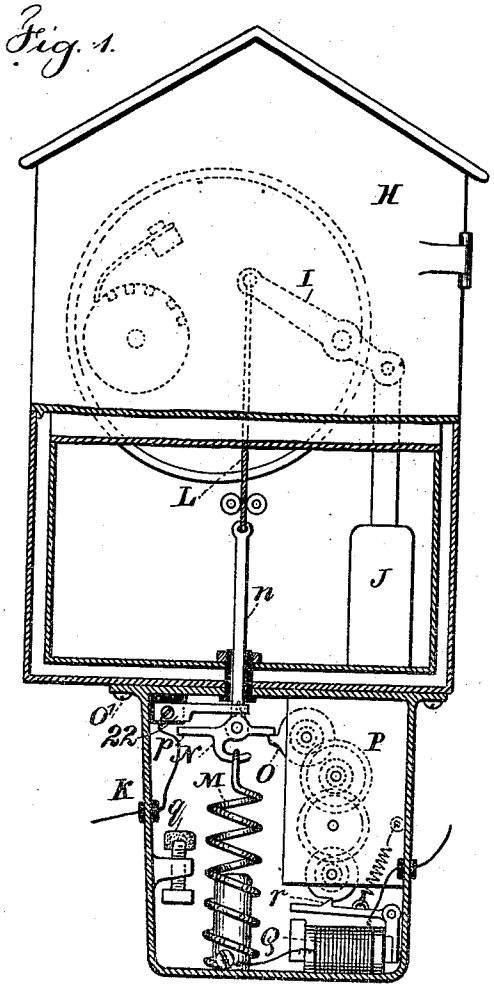


Fig. 2.

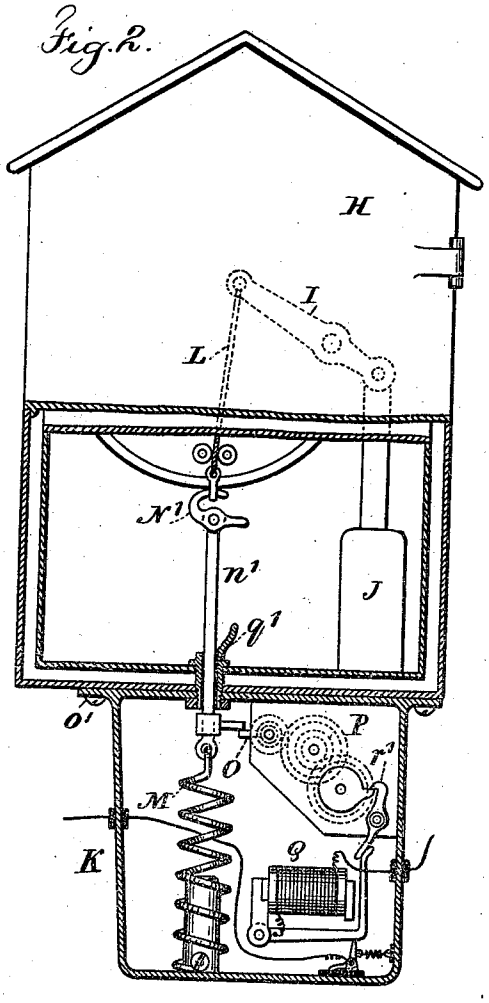


Fig. 6.

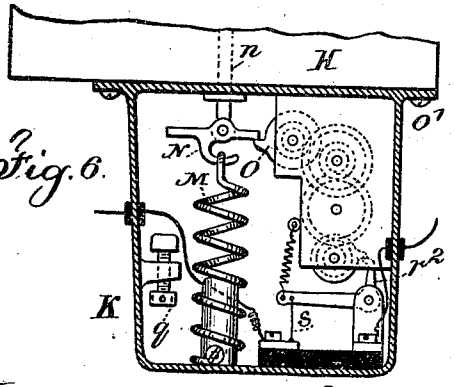


Fig. 7.

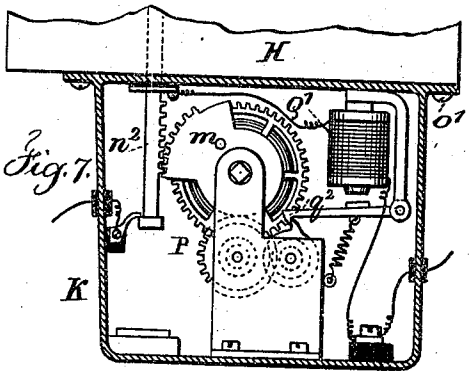
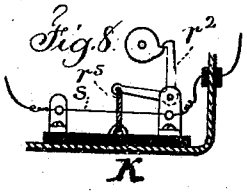


Fig. 8.



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(No Model.) 2 Sheets—Sheet 2.

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ELECTRIC SIGNAL FOR FIRE ALARM SYSTEMS.

No. 502,207. Patented July 25, 1893.

Fig. 4.

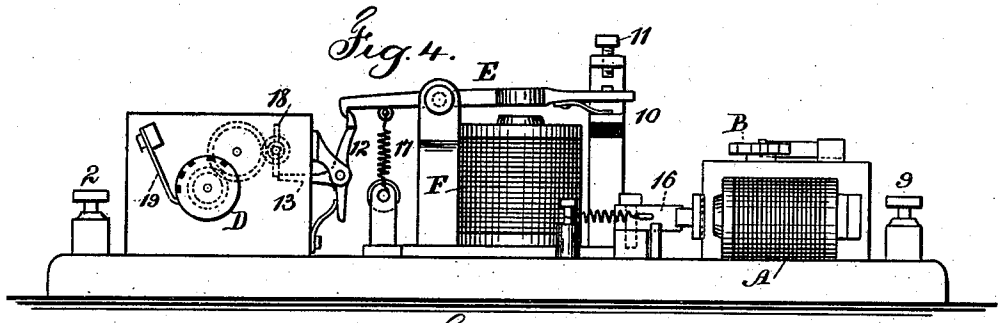


Fig. 3.

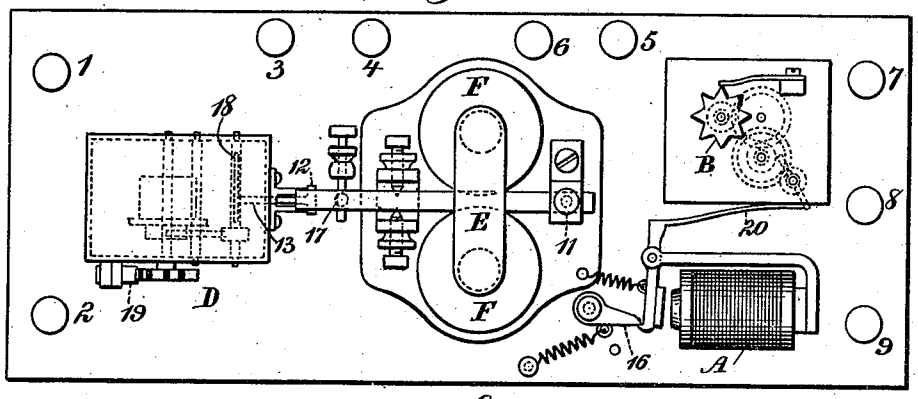
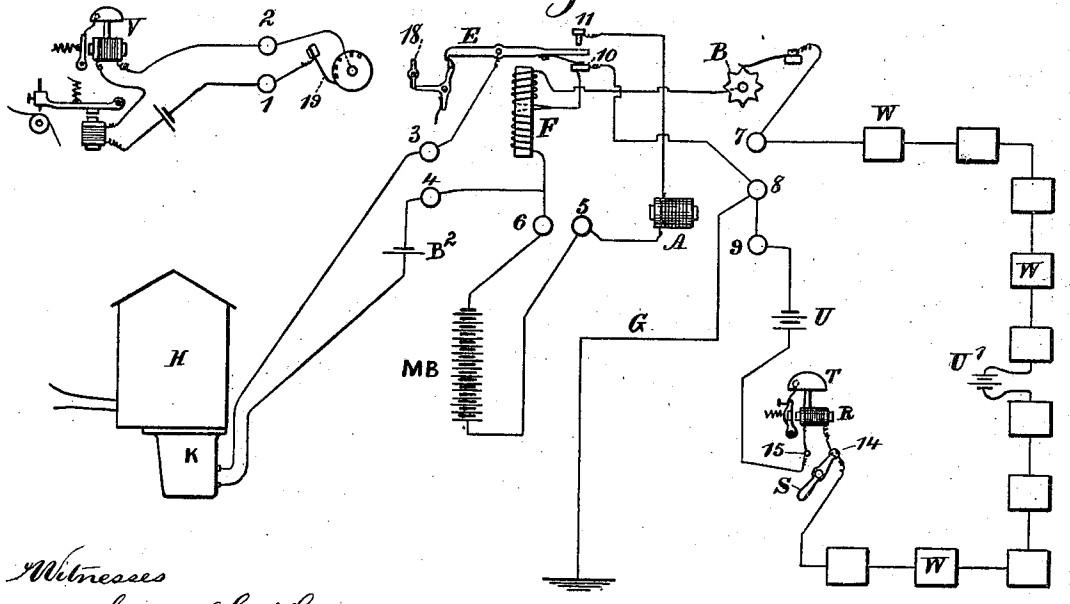


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH SACHS, OF NEW YORK, N. Y.

ELECTRIC SIGNAL FOR FIRE-ALARM SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 502,207, dated July 25, 1893.

Application filed April 10, 1893. Serial No. 469,669. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SACHS, a citizen of the United States, residing in the city and State of New York, have invented an Improvement in Electric Signals Especially Adapted to Fire-Alarm Systems, of which the following is a specification.

It has heretofore been usual, especially in cities, to provide call boxes in different locations and properly numbered and from which signals can be sent to a main station. Usually this system is employed for fire alarms; and my present invention is especially adapted to the fire alarm systems heretofore made use of, but the same may be used in connection with messenger calls, ambulance calls, &c. In connection with the ordinary call box I make use of an auxiliary electric curcuit and separate local call boxes upon such circuit in various buildings or parts of a building, so that by actuating either of the boxes in the auxiliary local circuit the main call box or fire alarm can be set off to give the signal at the central station.

As fire alarm systems have been extensively employed and considerable expense would be involved in making separate signal boxes for auxiliary or local circuits, one feature of my present invention relates to an appended call box that is adapted to be attached to the ordinary fire alarm call box so as to actuate the same in a manner corresponding to the actuation by hand, and this appended call box and the connection do not interfere with the use of the fire alarm box in the ordinary manner. I apply in the appended call box a motor that is sufficient to actuate the call box in a manner similar to the actuation by hand, and this motor is advantageously in the form of a spring that is wound up or distended by hand and connected with a trip mechanism, and the parts are held by a mechanical stop electrically controlled, so that when a current of electricity is caused to pass through the appended call box the mechanical stop is liberated and the motor allowed to pull the fire alarm box, and as the parts reach the extreme movement a trip or disconnecting device is brought into action to separate the motor from the fire alarm call box so as to allow the latter to return to its normal position in the manner similar to the return of such parts after having been pulled by hand; and I arrange the auxiliary local call boxes and the electric circuits and instruments therewith connected in the manner hereinafter described, so that when any box in the auxiliary local circuit is actuated the alarm is given at the main signal box.

In the drawings, Figure 1 is a section of the appended call box and the mechanism therein contained is shown in elevation. Fig. 2 is a similar view with the automatic trip differently arranged. Fig. 3 is a plan view, and Fig. 4 an elevation of the instrument made use of in the auxiliary local circuit at a place convenient for the connection to the main fire alarm box and to the other boxes in the auxiliary local circuit. Fig. 5 is a diagram of the electric circuit connections, and Fig. 6 is a detached view of a modification in the electric devices employed in the appended call box. Figs. 7 and 8 show modifications.

The ordinary fire alarm or other call box is represented at H and in this are the circuit closing wheels ordinarily provided, for sending out the electric signal by pulsations representing numbers, and this mechanism is operated by a weight or a spring, and at I is indicated the hook or lever that ordinarily is pulled down by hand; and I remark that it is unnecessary to give any detailed description of the ordinary fire alarm signal devices contained in the box or the circuit connections, as these are well known, and I have indicated at J a weight that is employed to actuate the mechanism in the ordinary signal box, but the weight in many instances is displaced by a spring that is used as the motor.

In my improvements the appended call box K is usually and advantageously applied below the call box H and it is adapted to be attached thereto by screws *o'* or other suitable devices, and this appended call box K is to be located in such a position that a cord or flexible connection L can be extended from the hook or lever I into the appended call box, and a suitable motor such as a spring M, Figs. 1, 2 and 6, is provided in the appended call box that is sufficiently strong to give the required movement to the hook or lever I, and I introduce between the spring M and the flexible connection or cord L a trip hook

N. In Fig. 1 this trip hook N is represented as upon a rod n passing through the bottom of the call box H and to which rod n the cord or flexible device is connected and extends to the hook or lever I. This hook N is adapted to pass into an eye at the end of the spring M, and it is provided with an arm that is held by the mechanical stop O which is preferably a projection upon the first wheel in a train of wheels P, and there is a stop electrically controlled for holding the last wheel in the train of gearing, so that the electric power is sufficient to withdraw this stop and allow the train of wheels to be rotated by the action of the spring M upon the trip hook, so that the spring M will pull down the hook or lever I of the ordinary call box, giving to the same the proper movement for throwing in the alarm, and the tail p of the trip hook comes into contact with a stop q as the movement approaches its completion to unhook the hook N from the spring M, so that the trip hook and its connection can return with the hook or lever I of the call box in the upward movement of the same and not interfere with the proper movement of the ordinary signaling box; and it is to be understood that after an alarm has been sent in, the appended call box is to be opened and the parts set again by hand in the normal position represented in Fig. 1.

In Fig. 2, substantially the same devices are represented as before named, only the trip hook N′ is at the upper end of the rod n' and the stop q' is at the upper end of a guide tube through which the rod n' passes.

I find it advantageous in liberating the mechanical stop O to employ an electro-magnet Q, the armature of which acts upon the pawl or claw r which holds the most rapidly moving wheel in the train of wheels, so that by withdrawing this pawl by the action of the electro-magnet Q, the train of wheels P is liberated and they move as aforesaid, and the mechanical stop O ceases to hold the hook N.

In Fig. 1 the armature of the electro-magnet Q is represented as provided with the pawl or claw r, and in Fig. 2 the pawl or claw r' is pushed back out of the way by the action of an arm upon the armature.

In Fig. 6, I have represented a fusible wire s which is in the electric circuit and serves to hold the pawl or claw r^2 when the parts in the appended call box are in the normal position, and this wire by its resistance becomes heated by the passage of the electric current and breaks or melts so as to liberate the stop r^2; or the hot wire may burn an adjacent cord or string r^5 to liberate the stop, r^2, as illustrated in the detached figure, Fig. 8.

In Fig. 7, I have shown a gear wheel m as acting upon teeth on the rack rod n^2, and the teeth on the wheel m are interrupted so that they separate after the wheel m has been rotated to pull down the cord L and thereby the parts are freed to allow the signal box to act as usual in giving the signal. This wheel m may be fitted with a main spring and winding shaft and ratchet wheel as in a clock movement, so as to be wound up between one actuation and the next, and the magnet Q′ acts upon the armature shaft q^2 to allow the gearing to be rotated when the current passes through such magnet. This wheel m might be actuated by an electric motor, but this and the interrupted gear for pulling the box form the subject of a separate application.

Having now described the mechanism employed in connection with the appended call box, I remark that the actuating electric current is to be supplied from a main battery M B in a suitable location, and this main battery is closed by disturbing the balance of a differentially wound electro-magnet F, one helix of which is in a local circuit passing through the auxiliary local call boxes, and the other is in a local circuit containing the magnet Q and a small battery B^2 that is not strong enough to act on the armature thereof, and the instrument containing this differentially wound magnet F may be located at any convenient place near the main fire alarm or call box H.

It is to be understood that any desired number of auxiliary local call boxes W may be employed in one local circuit passing to as many buildings or rooms as may be put into connection with the main call box H, and at each of these locations the auxiliary call box is to be provided with an electro-magnet R, a switch lever S, and a call bell T actuated by the armature of the electro-magnet R. In the normal position the switch S simply closes the local circuit through the contact pin 14, and hence there is little or no resistance in the local circuit containing the battery U. The circuit containing the auxiliary call boxes W also contains the battery U and one helix of the differential magnet F and the circuit to the appended call box K contains the battery B^2 and the other coil in the differential magnet F and the currents oppose each other, and in the normal position the armature E is delicately adjusted and the currents flowing through the differentially wound magnet F are so balanced by suitable rheostats or otherwise that such currents neutralize each other and the core of the magnet F is not magnetized, but when the balance of the currents is disturbed from any cause the magnetism set up in the core by the electric currents from either of the circuits causes the armature E to be attracted and the movements hereinafter described effected. If the switch S in either of the auxiliary call boxes is moved the circuit is broken, the balance is disturbed and the armature E responds, and this same effect is produced if a wire is broken or becomes short circuited or grounded; and with the object in view of giving a signal on the tell-tale instrument hereinafter described, it is advantageous to provide a ground connection G from the binding post 8, and also to divide the

battery U, placing a part near the middle of the circuit at U′ so as to short circuit or ground part of the current in case of the auxiliary local circuit becoming broken or interfered with.

The instrument represented in Figs. 3 and 4 consists of the differentially wound electro-magnet F and its armature E and an electro-magnet A in a branch circuit from 4 to 6 through the main battery M B to 5, thence through A to the back stop 11 of the armature E. There is a spring motor adapted to rotate the circuit breaking wheel B which is in the auxiliary alarm circuit heretofore described, and the fan of this motor is held by a spring 20 on the armature of the electro-magnet A, and there is a latch 16 behind this armature. Hence the motor for the wheel B is not rotated until the armature of A has been attracted, the latch 16 liberated and drawn out of the way by its spring and the current is again broken in A, allowing its armature to draw back, and when this has taken place, the motor is released and the rotation of the wheel B pulsates the current and rings the bell T in the auxiliary local call box, indicating that the signal has been properly given. The spring 17 of the armature E is delicately adjusted as usual and there is a prop block 12 beneath one end of the armature E, and at the other end of the armature E is a spring contact 10 and a back stop 11 and when the core of the differentially wound magnet F attracts the armature E it unlatches the prop block 12 and this falls away and the demagnetization of the core F or partial demagnetization by the currents passing through the differential helices being equal or nearly so after the balance has been restored allows the spring 17 to draw the armature away from the core and close the contact with the stop 11, throwing in the large battery M B. The circuit connections are made substantially as indicated in Fig. 5. The circuit wires from the appended call box K pass to the binding posts 3 and 4, and from 3 through the frame to the armature E and from the spring and contact 10 through one of the helices of the differential magnet to the post 4, and there is in this circuit the battery B^2, and the direction of the currents is the reverse to that from the battery U in the auxiliary local circuit through the binding post 7 and wheel B, the other helix of the differential magnet F, and by the contact 10 to the binding post 9 and auxiliary local circuit containing the switches S of the auxiliary call boxes, and these two currents neutralize each other. When one of the switches S is moved the auxiliary circuit is broken, the armature E is attracted, the prop block 12 is liberated and swings away, and by its further movement the switch S again closes the circuit by contact with the pin 15, and the differential magnet is again demagnetized by the balance of the currents, and the spring 17 acts on the armature E and closes the circuit with the back stop 11, so that the main battery M B is brought into the circuit through 11, E, 3 to the appended call box K, returning through B^2, 4, 6, M B and 5, and thence through the magnet A to the back stop 11, and the strength of this current is sufficient to bring into action the main fire alarm or call box, as before described. The current passing through the magnet A does not liberate the stop 16 and the fan and spring motor remain quiescent until the current through the appended call box is broken, and after this takes place the armature and spring 20 move back and the rotation of the wheel B pulsates the current sounding the bell T at the station or auxiliary local box from which the alarm was sent out.

It is advantageous not to break the circuit of the main battery M B until the pulling mechanism has been liberated. In cases where the fusible wire *s* Fig. 6, is in the circuit of M B the fusing of the wire breaks the circuit, and where the trip hook is made use of it is advantageous to employ the insulated finger 22 resting against the hook or a projection on the rod of the hook, the wire from the magnet Q going to the spring, so that the circuit is broken as soon as the hook is liberated and commences to move by the action of the spring.

It is often advantageous to provide a tell-tale instrument in a circuit where the main instrument is located, and with this object in view I provide a circuit breaking wheel D with a spring motor and fly 18, which fly 18 is held by a stop 13 connected with the prop block 12, and in the circuit from the binding posts 1 and 2 any suitable battery and sounding instrument are included, and the spring 19 that is in contact with the periphery of the circuit closing wheel D makes and breaks the tell-tale circuit, sounding an alarm bell V and giving the proper number of taps according to the making and breaking of the circuit by the rotation of the wheel D. This tell-tale circuit may pass if desired directly to some fire alarm station immediately contiguous to the auxiliary local circuit and alarm box, so as to sound at such engine house the number sent out by the circuit closing wheel D; but this tell-tale circuit is especially useful in detecting any ground or defect in the batteries which may be sufficient to disturb the balance of the currents in the differential magnet F, because should this disturbance occur there will be a magnetism developed in the core of the magnet F sufficient to attract the armature E and cause the prop 12 to fall and the wheel D to rotate, but the current will not be sent to the appended call box because the armature will not close with the back stop 11.

It will be understood that the spring devices in the boxes that actuate the wheels B and D are to be wound and the parts set so as to hold the respective fans or flies of the spring devices, and the parts are to be reset in the appended call box after the object of the alarm has been subserved.

I claim as my invention—

1. The combination with a main signal box containing a hand actuated pull for energizing the signal sending mechanism; of an appended call box, a motor in said call box, a connection between the same and the pull mechanism in the main signal box, an electrically controlled stop mechanism for liberating the motor in the appended call box, and means for disconnecting the motor from the pull at the completion of the downward movement, substantially as set forth.

2. The combination with the main signal box and its motor and circuit closing devices; of an appended call box, mechanism within the appended call box for actuating the main signal box, an electrically controlled stop for bringing into action the mechanism of the appended call box, and a trip mechanism for disconnecting the mechanism in the appended call box from the mechanism in the main signal box, substantially as set forth.

3. The combination with the main signal box and its motor and circuit closing devices; of an appended call box, mechanism within the appended call box for actuating the main signal box, an electrically controlled stop for bringing into action the mechanism of the appended call box, a trip mechanism for disconnecting the mechanism in the appended call box from the mechanism in the main signal box, and means for sending from the appended box a return call to the place from which the signal was sent out, substantially as set forth.

4. The combination with a device for actuating a signal sending box so as to send its signal, of a differential magnet, having one of its coils in the circuit containing the actuating device and a battery and the other coils in a circuit containing a battery and auxiliary signal boxes, and means for sending a return signal from the actuating device to the first circuit and then to actuate the return call in the auxiliary boxes.

5. The combination with a main signal box containing a hand-actuated pull for energizing the signal sending mechanism, of an auxiliary motor, a flexible connection between the auxiliary motor and the hand actuated motor of the main call box, an electrically controlled stop, an auxiliary circuit and call boxes therein for liberating the stop, and a trip mechanism for disconnecting the auxiliary motor at the end of its movement, substantially as set forth.

6. The combination with a main signal box, of a device for actuating the same, and a differential magnet, a return call, large battery, and the auxiliary sending or call device having therein a bell and a means for so changing the circuit on one side of the differential magnet that the differential magnet is so actuated as to throw into the circuit leading to the actuating device the large battery, and a means at said actuating device to cause it to release the return call device and cause said bell in the auxiliary box to ring when said actuating device is released.

7. The combination with a differential magnet of two circuits, one side containing a device for actuating a main signal box, and a battery, and the other a battery and auxiliary call boxes, each containing a circuit controller and a return call bell, and a device for changing the circuit and actuating the return call bell, said differential magnet being so arranged that when its balance is disturbed by the circuit controller it switches a larger battery into the circuit containing the actuating device, thereby releasing the same, and a means for properly releasing the device for changing the circuit of the auxiliary call boxes so as to ring the return call bell.

8. The combination with a main signal box containing a hand-actuated pull for energizing the signal sending mechanism, of an auxiliary motor, a flexible connection between the auxiliary motor and the hand-actuated motor of the main call box, a stop held by a wire in the electric circuit and means for releasing the said stop by heating or melting the wire, call boxes in the auxiliary circuit for closing the circuit, and a trip mechanism for disconnecting the auxiliary motor at the end of its movement, substantially as set forth.

9. The combination with a main signal sending mechanism, of an actuating device therefor in a circuit with a main battery, and call boxes at a distance from said actuating device and in another circuit, and a differential magnet and its armature susceptible to changes in either circuit, and so arranged as to throw a larger battery into the first circuit to energize the actuating device when the circuit has been changed at the auxiliary call boxes.

10. The combination with a main signal box, of an actuating device therefor, and auxiliary call boxes and a differentially wound magnet and circuit connections and batteries substantially as specified so arranged as to first open the circuit and then close it again through the return call magnet and thereby disturb the balance of the differential magnet and cause it to so change the circuit containing the actuating device as to cause the same to operate the main signal mechanism, and a means for changing this circuit and actuating the return call mechanism in the auxiliary boxes when the main signal mechanism has been properly tripped.

11. The combination with a main call box and its signal sending mechanism; of an auxiliary motor, an electrically controlled stop, an auxiliary circuit, whereby the auxiliary motor is brought into action, a trip mechanism for disconnecting the auxiliary motor at the end of its movement, and means for sending a return call, substantially as set forth.

12. The combination with a main signaling box and auxiliary mechanism for actuating the same, of an auxiliary local circuit and signaling devices, a main battery and circuit

connections, a differentially wound electro-magnet, one of its helices being in the auxiliary circuit to the signaling boxes and the other in the circuit to the auxiliary mechanism, substantially as set forth.

13. The combination with the main call box, of an appended call box and the electrically controlled mechanism therein for pulling said main call box, of a local circuit, auxiliary call boxes in the local circuit, a differential electro-magnet and its armature, and electric circuit connections, substantially as specified, controlled by the armature of the differential magnet, and a main battery brought into action by the armature of the differential magnet for causing the liberation of the mechanical stop in the appended call box, substantially as set forth.

14. The combination with a main fire alarm or other call box and electrically controlled devices for bringing the same into action, of a local circuit and auxiliary call boxes in such local circuit, each of such auxiliary local call boxes containing an electro-magnet, and bell; a differentially wound electro-magnet and its armature and circuit connections controlled by such armature, an electro-magnet A in the circuit of the main battery, a circuit breaking wheel and mechanism for operating the same, and a stop liberated by the armature of the said electro-magnet whereby the current is pulsated through the electro-magnet of the auxiliary local signal box and the bell thereof sounded, substantially as set forth.

15. The combination with a main signaling box and automatic mechanism for actuating the same, of an auxiliary local circuit and signaling boxes and battery in such auxiliary local circuit, a differentially wound electro-magnet and its armature, a main battery and circuit connections to the auxiliary local circuit and to the main signal box, substantially as specified, for bringing into action the main signaling box by a variation in the electric currents passing through the helices of the differentially wound electro-magnets, substantially as set forth.

16. The combination with a main signal box, and electrically controlled mechanism for actuating the same, of a differential magnet and two balanced circuits containing the helices thereof, one of which circuits also contains the electric controlling devices for the actuating mechanism of the main signal box, auxiliary call boxes and their circuit breaking devices in the other of such circuits, a main battery and its circuit connections controlled by the armature of the differential magnet and brought into circuit for actuating the main signal by either circuit breaking device in the auxiliary call boxes, substantially as set forth.

17. The combination with a main signal box, and electrically controlled mechanism for actuating the same, of a differential magnet and two balanced circuits containing the helices thereof, one of which circuits also contains the electric controlling devices for the actuating mechanism of the main signal box, auxiliary call boxes and their circuit breaking devices in the other of such circuits, a main battery and its circuit connections controlled by the armature of the differential magnet and brought into circuit for actuating the main signal by either circuit breaking device in the auxiliary call boxes, and a pulsator in the circuit of the auxiliary call boxes brought into action after the balance has been restored in the differential magnet, substantially as set forth.

Signed by me this 31st day of March, 1893.

JOSEPH SACHS.

Witnesses:
E. E. COATSWORTH,
FRANK J. TANNER.