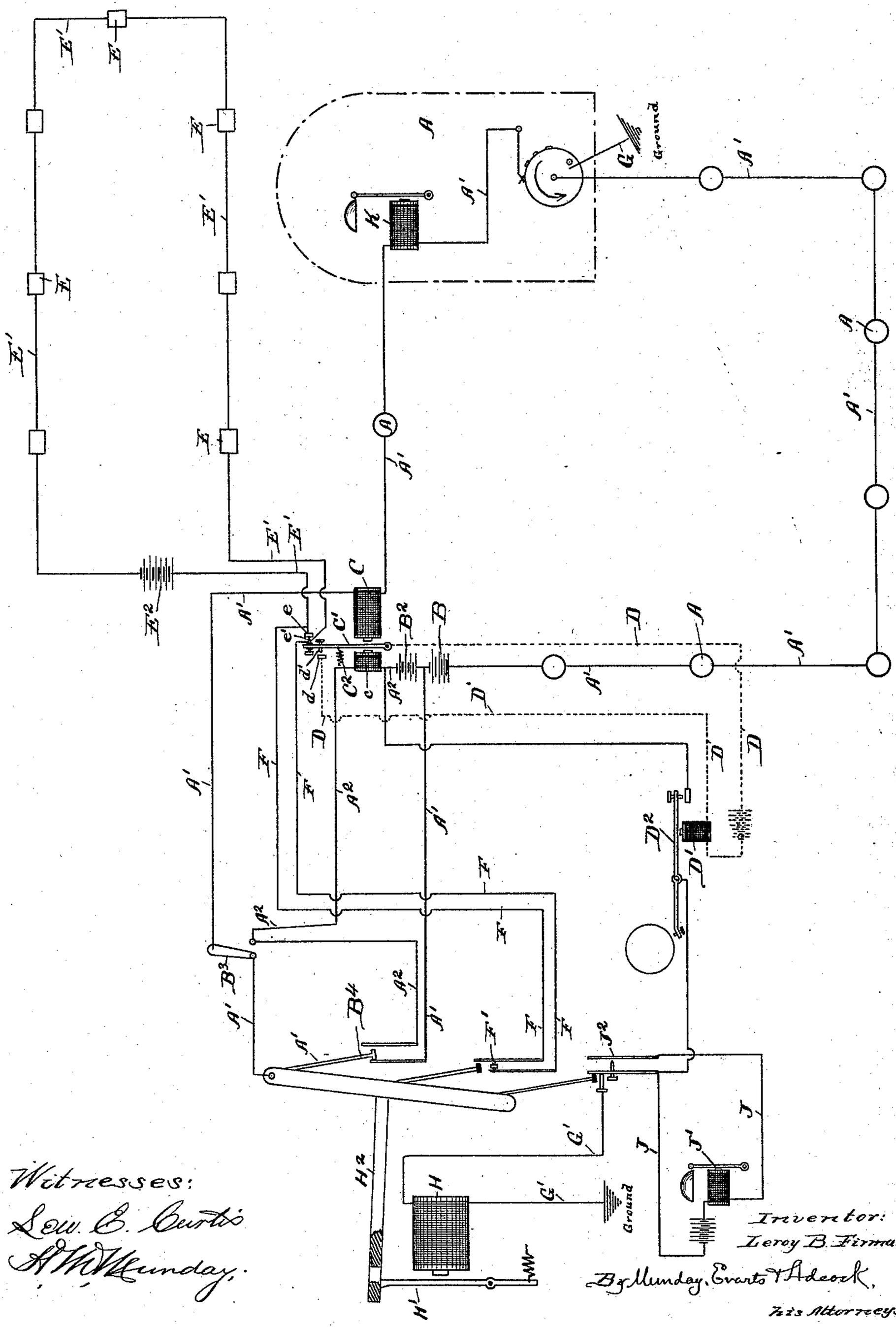
(No Model.)

L. B. FIRMAN.

COMBINED POLICE AND FIRE ALARM SIGNAL APPARATUS.

No. 470,667. Patented Mar. 15, 1892.



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UNITED STATES PATENT OFFICE.

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COMBINED POLICE AND FIRE-ALARM SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 470,667, dated March 15, 1892.

Application filed November 28, 1890. Serial No. 363,329. (No model.)

To all whom it may concern:

Be it known that I, LEROY B. FIRMAN, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in a Combined Police and Fire-Alarm Signal Apparatus, of which the following is a specification.

This invention relates to an improvement in combined fire-alarm and police-circuit systems.

The object of the invention is to simplify the mechanism and apparatus necessary at the central office or station and also to adapt the system to send police or general calls directly to the central office only and to send fire calls or alarms both to the central office and to the fire-engine houses, thus avoiding the necessity of a manual repetition of the fire-signals at the central office to the engine-houses, and also to provide means for sending signals from the central office to the various fire-alarm boxes without interfering with any signals or alarms which may be on the line at the time.

In the accompanying drawing, which forms a part of this specification, is shown a diagrammatic representation of the apparatus and circuits employed in my improved system.

In said diagram, A A A, &c., represent the usual alarm and police signal boxes of the kind now generally in use.

A′ is the main metallic circuit upon which said boxes are placed, and B is the battery or source of electric energy for supplying said metallic circuit.

In the circuit A′ and at the central office is located a relay-magnet C, the armature of which C′ is held away from the magnet C when the magnet is not energized by means of a coiled spring C^2. The action of this coiled spring C^2 when the magnet C is not energized is to close the contact-pieces *d d′* in a local circuit D, containing the magnet D′ of the receiving or recording mechanism at the central office, the armature D^2 of which is actuated to register or otherwise indicate in any of the well-known ways the making and breaking of the main circuit A′ by the signal-box or the apparatus therein contained.

E E are the several fire-engine houses connected together by the metallic circuit E′, energized by the battery E^2. Terminals or contact-points *e e′* from this metallic circuit are brought to juxtaposition with the armature C′ of the magnet C. One of said terminals *e′* is carried upon the armature and insulated therefrom. The arrangement is such that when the magnet C is energized contact is made between the terminals *e* and *e′* directly. A shunt-circuit F runs from the contact-point *e* to the contact-point *e′* and is kept normally closed, but is provided with a switch for opening the same at F′. So long as the switch F′ is kept closed and the shunt F therefor intact the action of the relay-magnet C will have no effect upon the circuit E′ going to the engine-houses; but if the shunt-circuit be broken at F′, then the action of the relay-magnet C will be to make and break the engine-house circuit E′, and consequently to send any signal made on the main circuit A′ to the engine-house circuit E′. It will be seen, therefore, that in order to send a signal from any one of the signal-boxes A, either to the central office alone or to both the central office and the engine-houses at will, it will only be necessary to arrange means at each signal-box for changing the condition of the shunt-circuit F—that is to say, means for breaking said shunt-circuit, if desired. The means I provide for this purpose consists of a ground-wire G, which may be put on or taken off at will at said box. Such a ground-wire and means for putting it on at will and taking it off automatically is already usually found in the ordinary signal-boxes. In order that the grounding of the circuit at the signal-box may operate to open the shunt-circuit F at the switch F′, I provide a wire G′, which passes through the armature of the registering-instrument, and is therefore always closed when the main line A′ is opened and the local circuit closed. On this wire G′ is the tripping-magnet H, the armature H′ of which supports normally a bar H^2, the dropping of which serves to open the switch F′. When the ground is made at the signal-box A, the

tripping-magnet H is energized and the bar H^2 tripped or dropped. The ground connection thus made will be immediately broken, and this may be done by hand or by the automatic operation of the signal-box in its sending in of the signal or at the central office automatically. When the bar H^2 is once tripped and dropped, it remains so until it is lifted up by hand, and in order to call the attention of the operator at the central office to the effect that a fire-signal has been sent in and out to the fire-engine houses I provide a local circuit J, in which is a vibrating signal-bell J'. The fall of the trip-bar H^2 is arranged to close this local circuit J at the contact J^2. The bell thus set in operation continues to ring until the trip-bar is raised.

By the apparatus as thus far described it will be understood that from any one of the signal-boxes signals may be sent to the central office alone or simultaneously to the central office and to the fire-engine houses. If the signal is to be sent to the central office—as, for example, a police report or call—the ground is not put on at the signal-box; but if it is desired to send the signal to the fire-engine houses simultaneously with its transmission to the central office, then this may be done by putting the ground on at the signal-box, and it will also be seen that this putting on or leaving off of the ground connection at the signal-box may be arranged for automatically, so that when a fire-signal is sent in the ground will be put on momentarily to trip the switch-bar H^2, and the fire-signal will be sent to the engine-houses as well as to the central office, while in case a police report or signal is to be sent in the ground will not be put on, and this signal will not go to the fire-engine houses, but only to the central office.

I now come to the means by which a signal may be sent over the main circuit A' without interference with any signal which may be upon that circuit at the moment. I accomplish this by means of sending into said circuit A' an extra amount of battery strength, so as to produce a variable current upon the line as follows: K is a bell-operating magnet or other translating device so adjusted or constructed that a current of ordinary strength will not cause it to operate, but which will operate when a current of greater than normal strength is passed over the line. In the normally-open shunt A^2, connected to the circuit A', I locate an additional battery B^2. A switch B^3 is provided, by means of which this additional battery may be thrown to line or cut out, as desired. By moving the switch B^3 in one direction the increased current may be sent to the line, and by moving it in the other direction removed from the line at will. Thus by moving this switch any number of strokes may be sounded upon the bell by the magnet K at the signal-box; but as this additional amount of current thrown onto the main circuit A will directly influence the relay-magnet C and cause it to be more strongly energized than under normal circumstances, unless some provision be made for compensating for this extra battery-power, said relay will be thrown out of adjustment and not respond to the ordinary signals which may be sent over the line. As a means for compensating for this extra amount of battery-power I provide the compensating magnet *c*, arranged opposite to the magnet C to pull against it, so that the two magnets tend to pull the armature in opposite directions. Now it will be seen that when the additional battery is thrown to line at the same instant the additional magnet is energized and the additional energy given to the magnet C compensated for—that is to say, the additional amount of energy is added to the magnets on opposite sides of the armature in such manner that the two magnets balance each other, leaving the magnet C free to perform its operation the same as when the additional battery is not on the line. I have found by experiment that a proper relation between these two magnets is given when the magnet C is of, say, fifty ohms resistance, while the magnet *c* is of eight ohms resistance, both being wound with wire of the same size.

I sometimes provide for an automatic or return call in case of a fire-alarm being sent in, as follows: A contact point or switch B^4 on the drop-bar H^2 is arranged to transfer the current to the shunt A^2 in the same manner that the switch B^3 transfers the current, except that it does it automatically when the ground is made at the signal-box and the drop-bar H^2 caused to fall. The purpose of such an automatic return-signal is of course in order that the sender at the signal-box may be apprised that the fire-alarm signal has been correctly received at the central office and that no accidental break exists.

I claim—

1. The combination of a main circuit containing a battery or source of electric energy, a signal-sending device and a relay, a second circuit operated by said relay, a shunt to the main circuit containing a signal-sending device, an additional battery, and a magnet or compensating relay with a signal-receiving device on the main circuit, said signal-receiving device on the main circuit being responsive only to the current strength of both batteries, substantially as specified.

2. In a police and fire-alarm signal system, the combination, with a main line or circuit having included therein a series of signal-boxes, each comprising a transmitting and a receiving instrument, and a receiving and a transmitting instrument at the central office, of an extra battery included in a normally-opened shunt-circuit, said main circuit having included therein a compensating relay, and a switch or device for connecting the

shunt with the main circuit, substantially as specified.

3. The compensating relay composed of two magnets opposing each other in their action upon an armature, one of said magnets connected in the main circuit containing a battery and the other connected in a shunt-circuit containing an additional battery, substantially as specified.

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