

No. 616,082.

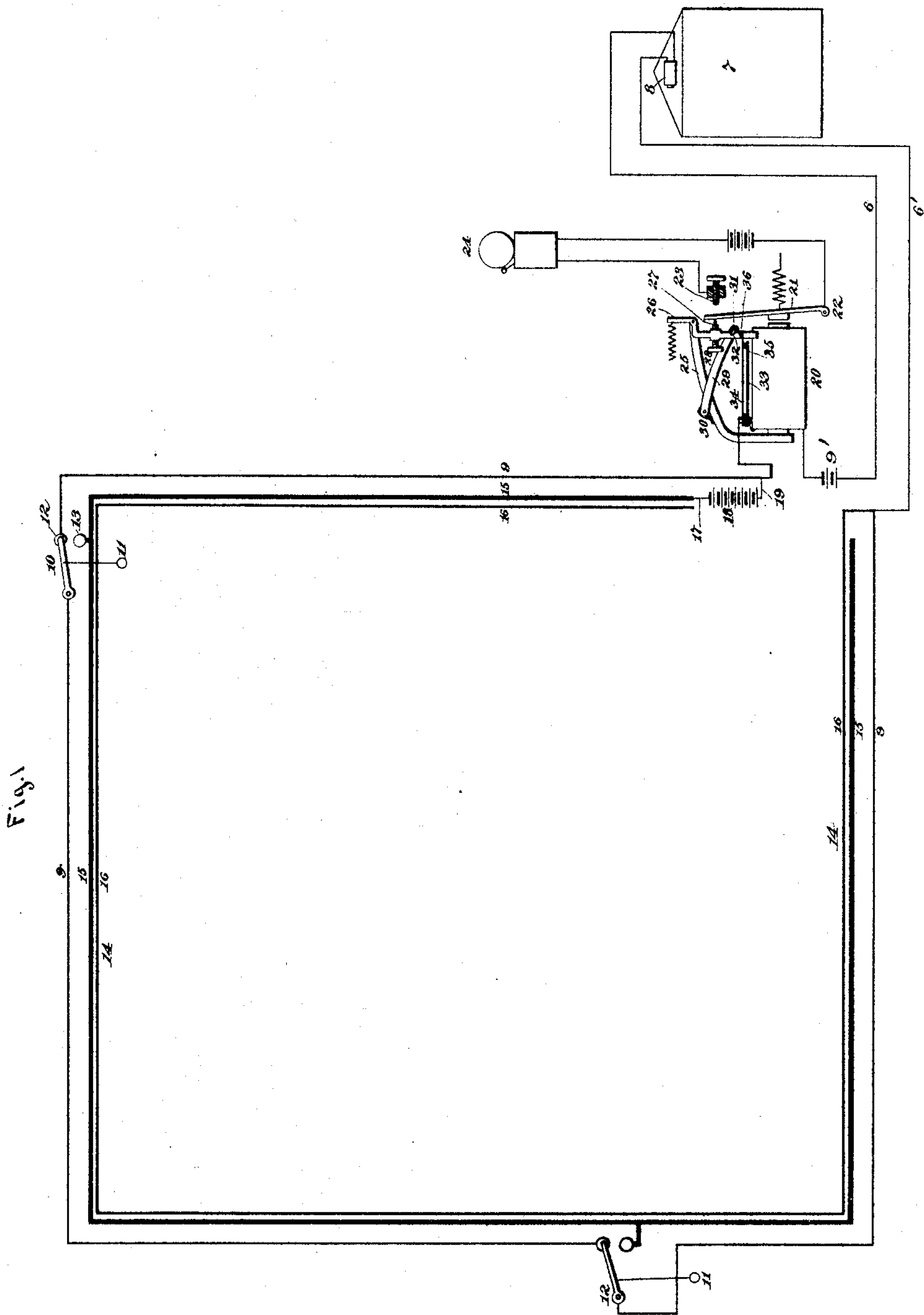
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A. H. CROSS.

THERMOSTATIC AUXILIARY FIRE ALARM SYSTEM.

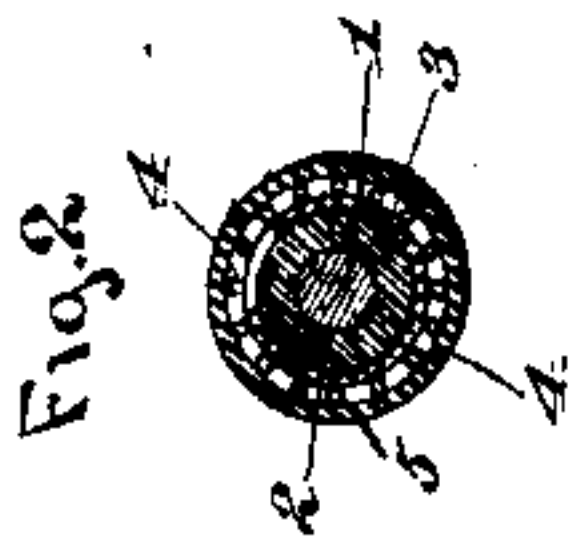
(Application filed June 1, 1898.)

(No Model.)



Witnesses:

John Coleman
Frank L. Dyer



Inventor
Albert H. Cross
By Rich. H. Dyer
Atty.

UNITED STATES PATENT OFFICE.

ALBERT H. CROSS, OF NEW YORK, N. Y., ASSIGNOR TO THE GAMEWELL
AUXILIARY FIRE ALARM COMPANY, OF BOSTON, MASSACHUSETTS.

THERMOSTATIC AUXILIARY FIRE-ALARM SYSTEM.

SPECIFICATION forming part of Letters Patent No. 616,082, dated December 20, 1898.

Application filed June 1, 1898. Serial No. 682,241. (No model.)

To all whom it may concern:

Be it known that I, ALBERT H. CROSS, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Thermostatic Auxiliary Fire-Alarm Systems, of which the following is a specification.

My invention relates to various new and useful improvements in auxiliary fire-alarm systems which will operate to automatically trip or otherwise actuate the starting or controlling mechanism of a street-box to send in an alarm, but which may also be provided with means by which the street-box may be manually operated from one or more points on the auxiliary circuit.

In carrying out my invention I provide a suitable thermostatic or compound wire which is included in the auxiliary circuit and which is extended throughout the dwelling, warehouse, or other building to be protected, but being preferably exposed as much as possible, so as to be subjected to any fire which may be started. This wire may be of any well-known construction; but preferably it comprises a compound conductor consisting, first, of a copper core; second, a layer of a fusible metal surrounding said core; third, a layer of insulation, preferably textile in character, surrounding the fusible wire; fourth, a plurality of conductors generally arranged spirally around the outside of such insulation, and, finally, an outer sheathing of any suitable character. The layer of insulating material between the fusible metal and the plurality of conductors is of a textile character, as explained, so that under the effect of heat the fusible metal may melt and percolate through the interstices of such insulating layer to short-circuit the interior conducting-core and one or more of the outer conductors.

In its simplest form my invention will comprise a suitable thermostatic or compound wire directly included in an open-circuit auxiliary system and arranged throughout the building to be protected, whereby upon the starting of a fire the heat thereof will melt the fusible metal, short-circuiting the two conductors, thereby bridging the auxiliary

circuit and starting the street-box. Such a system obviously may also include switches arranged at proper points and by which the auxiliary circuit may be closed by hand for operating the street-box. Preferably, however, my invention is applied in connection with a closed-circuit system, as is now common, such systems being preferable owing to the facility with which breaks or other derangements may be automatically detected by mechanism familiar to those skilled in the art. With a closed-circuit system I combine with a compound or thermostatic wire a third wire made of fusible metal and which will be extended throughout the building, preferably parallel with the compound wire, the third wire being normally closed in the auxiliary circuit on a small gravity-battery insufficient to actuate the street-box. One conductor of the compound wire in a closed-circuit system is connected with one pole of the main battery, the other pole of which is connected to one side of the auxiliary system, and the other conductor or conductors of the compound wire being connected to the other side of the auxiliary system. Suitably-arranged manually-operated switches are provided which normally complete the circuit through the third wire to maintain the auxiliary circuit closed through the gravity-battery, but each of which is adapted to make contact with contact-plates connected to the same conductor of the compound wire as the main battery. In this way the street-box can be tripped from the auxiliary system by operating any one of the switches to first break the circuit through the third wire and to then complete the circuit through the main battery and a part of the compound wire, as will be explained. In the event of a fire the third or fusible wire will first be melted to break the circuit at that point, and the heat will then cause the fusible metal of the compound wire to melt and percolate through the textile insulating layer to short-circuit the two conductors thereof, throwing the main battery into the auxiliary circuit and operating automatically the street-box. By means of my invention, therefore, it will be seen that provision is made which an alarm may be automatically transmitted to the street-box by a fire occurring in

any room or at any point of the building or dwelling instead of at frequently remote and isolated points, as is the case when separate thermostats are employed.

5 It will furthermore be seen that by means of my invention all thermostatic contacts are dispensed with, which have heretofore been a source of objection, as they become corroded and covered with dust and frequently fail to
10 operate.

Finally, my invention is of advantage in that the street-box is automatically operated only in the event of a very material rise in temperature, whereas with thermostats as
15 now constructed they are liable to operate at temperatures which are well within the safety limits.

In the accompanying drawings, Figure 1 illustrates, diagrammatically, my present im-
20 provements applied to a simple type of closed-circuit auxiliary fire-alarm apparatus; and Fig. 2 is a cross-section, on an enlarged scale, of the preferred form of thermostatic or compound wire employed.

25 Referring first to Fig. 2, 1 represents an electrical conductor, around which is placed a layer or coating 2 of a suitable fusible metal. 3 is an insulated layer, made, preferably, of textile material, and 4 4 are small conduct-
30 ing-wires which are preferably spirally wound upon the latter. The entire cable is covered by a sheathing 5 of insulating material and of any suitable character. Compound or thermostatic wire of the type referred to is a well-
35 known article of manufacture, and I do not claim the same *per se*.

Referring to Fig. 1, 6 6' represent the wires of an auxiliary circuit on the outside of a building, extending to a street-box 7, the said
40 auxiliary circuit including a magnet 8 or other mechanism for tripping, starting, or controlling the box. 9 is a third wire, made of suitable fusible metal, either bare or insulated, and extended throughout the rooms or through
45 the exposed portions of a dwelling, warehouse, or other building. This wire normally closes the auxiliary circuit 6 6' through a small gravity-battery 9', which is insufficient to start the box, but which may be employed
50 for the usual testing purposes or for indicating in any suitable and approved way any derangements in the auxiliary circuit within or outside of the building, as I shall describe. In the circuit 9 may be placed one or more
55 switches 10 within suitable auxiliary boxes, which switches are adapted to be pulled by a ring 11, as is now common, the said switch passing in its movement from the contact-plate 12 of the circuit 9 to the contact-plate
60 13. The switch in passing between these contact-plates may make contact with a third plate when it is desired to effect a return-signal at the auxiliary box, as is now common with systems of this kind.

65 In Fig. 1 the compound thermostatic wire is illustrated generally at 14, the two conductors being designated, respectively, 15 and

16 and being distinguished by lines of different thicknesses. This compound or thermostatic wire is extended throughout the
70 building parallel with the fusible wire 9 and preferably close to the same. If desired, the fusible wire 9 may be wrapped loosely around the compound wire, or it may be otherwise secured to the same. The conductor 15 is
75 connected by a wire 17 to one pole of the main battery 18, the other pole of that battery being in series with the gravity-battery 9' through a wire 19. The other conductor 16 of the compound or thermostatic wire is
80 connected to the street-wire 6' of the auxiliary circuit. The plates 13 are connected by wires with the conductor 15 of the compound or thermostatic wire.

The operation of my improved auxiliary
85 fire-alarm system is as follows: Normally the circuit extends from the street-box, wire 6, gravity-battery 9', wire 9, contact-plates 12, switch-arms 10, and wire 6' back to the box,
90 including the starting-magnet 8 or other device. The current of the battery 9' will hence constantly affect the line and may be employed in any well-known way for test purposes or for indicating breaks or derange-
95 ments therein. When an alarm is to be sent in manually at any auxiliary box, the ring 11 will be pulled, moving one of the switch-arms 10 from the plate 12, breaking the circuit 9, and closing the circuit through the
100 main battery through the plate 13, the circuit through the main battery therefore extending from the box, wire 6, gravity-battery 9', wire 19, main battery 18, wire 17, conductor 15, plate 13, switch-arm 10, and
105 street-wire 6' back to the box. The current of the main battery will be sufficient to trip the box in any suitable way to send in the alarm. In the event of fire or an abnormal rise in temperature the fusible wire will
110 first be ruptured by the heat, operating in the same way as by the breaking of that circuit by moving the switch-arm 10 from the contact-plate 12. The fusible metal 2 in the compound wire will also melt, and, percolating
115 through the interstices of the insulated layer 3, will short-circuit the conductors 15 and 16, so that the main battery will be thrown into the circuit with the box to actuate the same. This circuit, it will be noted, will extend from
120 the box 7, street-wire 6, gravity-battery 9', wire 19, main battery 18, wire 17, conductor 15, across the bridge formed by the melting of the fusible metal to the conductor 16, and street-wire 6' back to the box.

In the Gamewell auxiliary fire-alarm sys-
125 tem, with which my invention is adapted for use, the auxiliary circuit is arranged to be broken at the street-box immediately after the box commences to operate, in order that a return-signal may be transmitted to the
130 auxiliary box and the operator thereat may know that the signal has been received and is being transmitted by the street-box. After the street-box has sent in the signal, however,

the auxiliary circuit is reestablished, and when the tripping-magnet 8 has been reset the auxiliary circuit is ready for further operation. In case the auxiliary circuit has been manually operated the return of the switches 10 to close the circuit 9 through the gravity-battery will enable the operating-magnet 8 at the street-box to be reset. When, however, the auxiliary circuit has been actuated automatically by a fire, the circuit through the main battery will be maintained closed between the conductors 15 and 16 and it will be impossible to reset the magnet 8, or if that magnet were reset the street-box would be again immediately operated. With this type of apparatus, therefore, I make use of a relay 20 which is included in the circuit 9 in each auxiliary system—as, for example, between the gravity-battery 9' and the wire 19. The relay 20 is provided with an armature 21, pivoted at 22, which may make contact with a back stop 23 to close a local circuit through a bell 24.

25 is a support carried by the yoke of the relay-magnet, and 26 is a lever pivoted in said yoke, the lower end of said lever working between the two coils of the relay. The said lever carries an insulated stud 27, mounted on an adjusting-screw 28, which stud forms a front stop for the armature 21. A locking-lever 29 is pivoted on the support 25 and is normally elevated by a spring 30, coiled around its pivot. The said locking-lever carries a stud 31 at its forward end, which engages in a notch 32 in the lever 26, so as to lock said lever in the normal position shown.

33 is a heavy spring-contact, and 34 a light spring-contact, insulated from each other at their rear ends, but normally making contact at their forward ends through the two contact-pieces 35, as shown. The spring-contacts 33 and 34 are normally maintained in engagement by means of a pin 36, carried on the lever 26, near its lower end. The said spring-contacts 33 and 34 are in series with the coils of the relay-magnet and the conductor 9.

By the use of a relay arranged as shown it will be observed that the normal closure of the circuit 9 through the gravity-battery will energize the relay sufficiently to maintain its armature in contact with the insulated front stop 27, breaking the local circuit through the bell 24. If, however, this circuit becomes accidentally broken or otherwise deranged, so as to deenergize the relay 20, the armature 21 will be engaged with the back stop 23 to close the circuit through said bell and thereby give a notification of this fact.

In operating the auxiliary system the closure of the circuit through the main battery will, in addition to tripping the street-box, energize the relay 20 sufficiently to cause its armature to trip the lever 26 from the latch 29, said latch therefore moving upwardly on its pivot. This movement will not break the circuit between the spring-contacts 33 and 34, as will be obvious. When, however, the

circuit is broken at the street-box, the relay 20 will be deenergized, allowing the armature 21 to be retracted, whereupon the spring-contacts 33 and 34 will separate to break the auxiliary circuit at that point, and the said auxiliary circuit will not be reestablished until the spring-contacts 33 and 34 have been again engaged, and are held in this position by the locking of the lever 26 by means of the locking-lever 29. It will thus be seen that when the auxiliary circuit is operated automatically and the conductors 15 and 16 are short-circuited, the auxiliary circuit will be broken at the relay 20, so as to allow the auxiliary magnet of the street-box to be reset, after which the fused section or sections of the auxiliary circuit may be repaired and the circuit put in condition for further use.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In an auxiliary fire-alarm system, the combination with a street-box, of a normally-closed auxiliary circuit including a section of fusible wire extending throughout a building, and a compound or thermostatic wire arranged parallel to said fusible wire and normally disconnected from the auxiliary circuit, substantially as set forth.

2. In an auxiliary fire-alarm system, the combination with a street-box, of a normally-closed auxiliary circuit including a section of fusible wire extending throughout a building, a compound or thermostatic wire arranged parallel to said fusible wire and normally disconnected from the auxiliary circuit, and a main battery connected to said thermostatic or compound wire, substantially as set forth.

3. In an auxiliary fire-alarm system, the combination with a street-box, of a normally-closed auxiliary circuit in which is included a section of fusible wire, a manually-operated switch for breaking the circuit of said fusible wire, a compound or thermostatic wire arranged parallel with the fusible wire and normally disconnected from the auxiliary circuit, and a contact-plate with which said switch may make contact connected to said compound wire, substantially as set forth.

4. In an auxiliary fire-alarm system, the combination with a street-box, of a normally-closed auxiliary circuit in which is included a section of fusible wire, a manually-operated switch for breaking the circuit of said fusible wire, a compound or thermostatic wire arranged parallel with the fusible wire and normally disconnected from the auxiliary circuit, a contact-plate with which said switch may make contact connected to said compound wire, and a main battery connected to said compound wire, substantially as set forth.

5. In an auxiliary fire-alarm system, the combination with a street-box, of a normally-closed auxiliary circuit including a section of fusible wire extending through a building, a

compound or thermostatic wire arranged parallel to said fusible wire and normally disconnected from the auxiliary circuit, and a relay in the auxiliary circuit controlling a local circuit in which is included a signaling device, substantially as set forth.

6. In a normally-closed auxiliary fire-alarm system wherein the auxiliary circuit is broken at the street-box after the latter has started, the combination with a street-box, of a normally-closed auxiliary circuit including a section of fusible wire extending throughout a building, a compound or thermostatic wire arranged parallel to said fusible wire and normally disconnected from the auxiliary circuit, a main battery connected to said thermostatic or compound wire, a relay in the auxiliary circuit, and a circuit-breaking device in the auxiliary circuit controlled by said relay, substantially as set forth.

7. In a normally-closed auxiliary fire-alarm system wherein the auxiliary circuit is broken

at the street-box after the latter has started, the combination with a street-box, of a normally-closed auxiliary circuit including a section of fusible wire extending throughout a building, a compound or thermostatic wire arranged parallel to said fusible wire and normally disconnected from the auxiliary circuit, a main battery connected to said thermostatic or compound wire, a relay in the auxiliary circuit, a circuit-breaking device included in the auxiliary circuit, and a tripping device controlled by said relay for breaking the auxiliary circuit at the relay when the auxiliary circuit is broken at the street-box, substantially as set forth.

This specification signed and witnessed this 27th day of May, 1898.

ALBERT H. CROSS.

Witnesses:

JNO. R. TAYLOR,
FRANK L. DYER.