No. 730,422. PATENTED JUNE 9, 1903.

J. WEATHERBY, JR.

ELECTRIC PROTECTIVE SYSTEM.

APPLICATION FILED AUG. 11, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

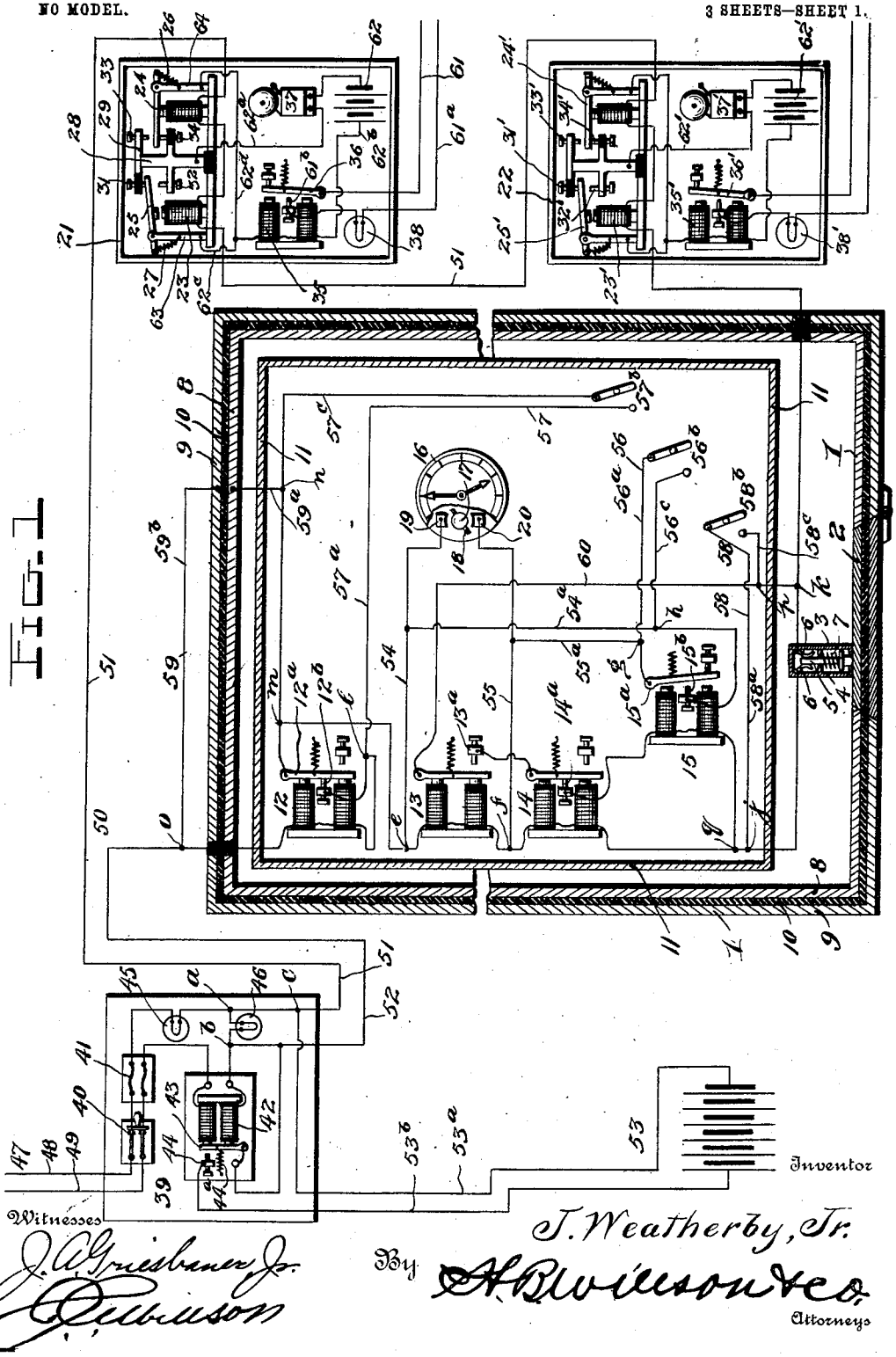


FIG. 1

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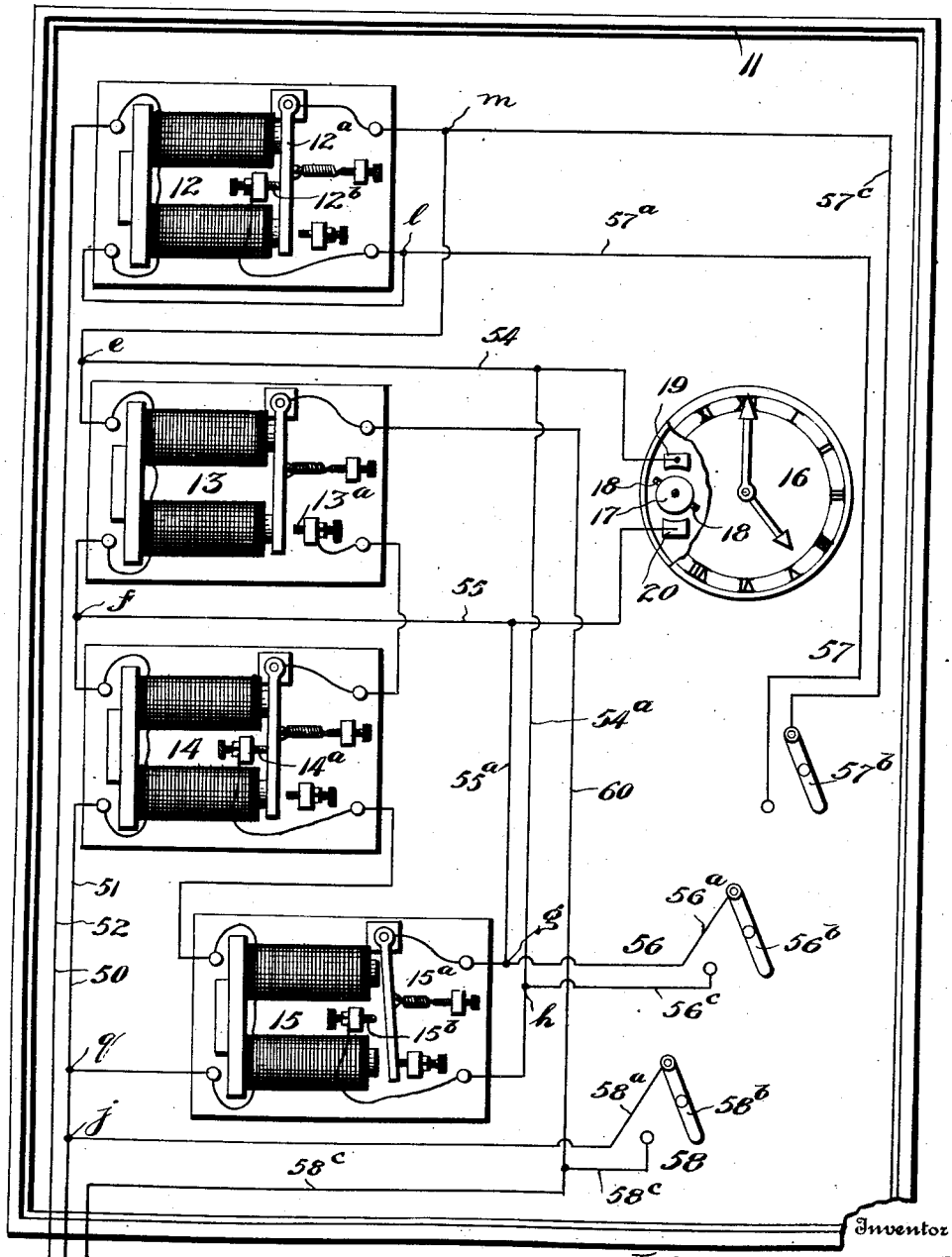
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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2



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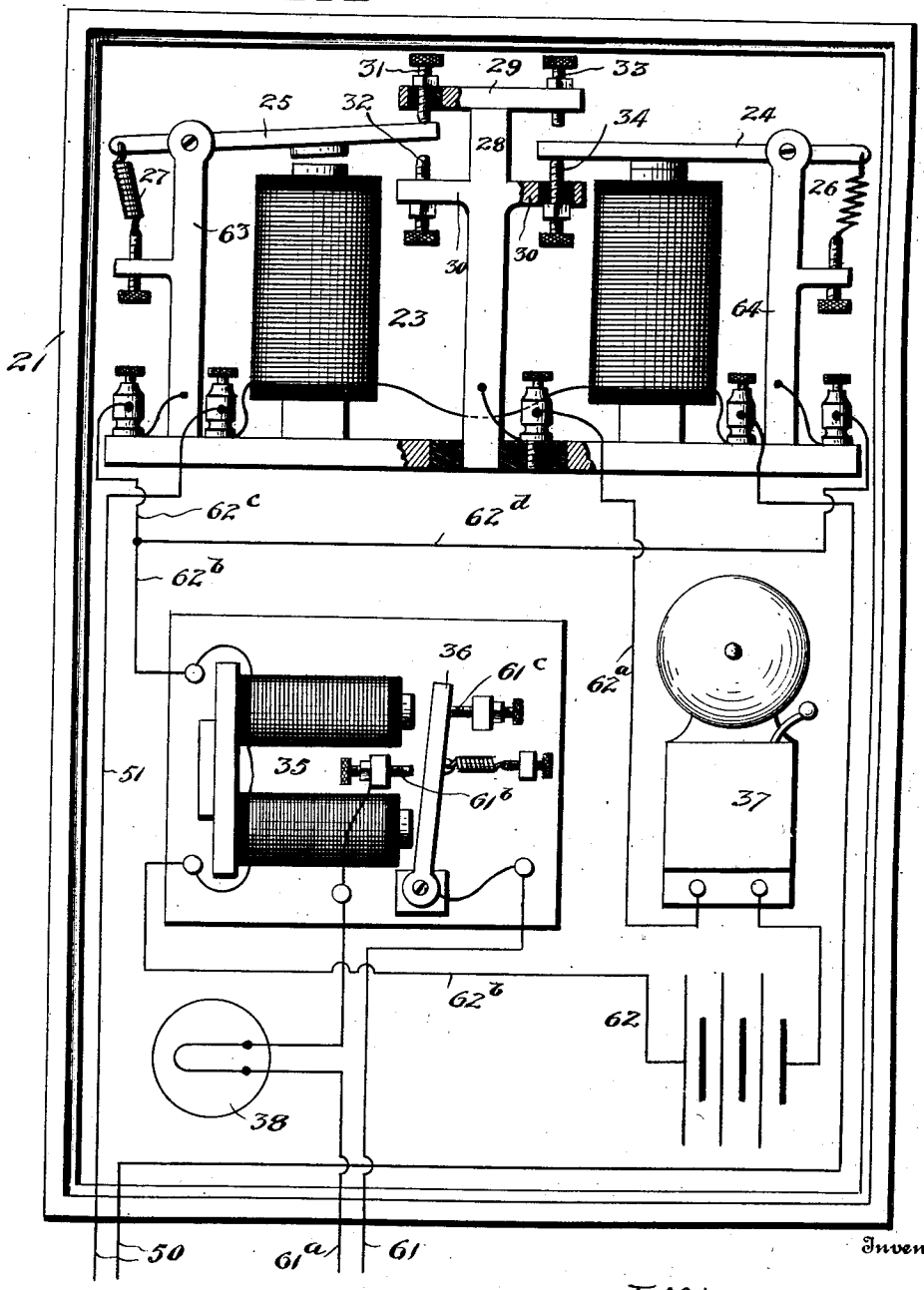
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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3



Witnesses

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No. 730,422. Patented June 9, 1903.

UNITED STATES PATENT OFFICE.

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ELECTRIC PROTECTIVE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 730,422, dated June 9, 1903.

Application filed August 11, 1902. Serial No. 119,293. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH WEATHERBY, Jr., a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Protective Systems; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to an electric protective system particularly designed for use in connection with safes, vaults, buildings, and other structures.

The object of the invention is to provide a system of this character whereby should an unlawful or unauthorized attempt be made to enter the safe, vault, or other structure due notice thereof will be communicated to the proper authorities to enable them to take steps to frustrate the attempt to unlawfully enter the safe, vault, or other structure.

With the above and other objects in view, which will readily appear as the nature of the invention is better understood, said invention consists in certain novel features of construction and combination and arrangement of parts, which will be hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic view of a complete system. Fig. 2 is an enlarged view of a strong box, the door being removed to illustrate its inclosed circuit-controlling mechanism and the various circuits. Fig. 3 is an enlarged view of one of the signal-boxes, the cover being removed to more clearly illustrate the parts therein contained.

In the accompanying drawings, 1 denotes a safe, vault, building, or other structure desired to be protected, and 2 denotes the entrance-door.

3 denotes a circuit-connector of any desired construction, shown in the present instance as consisting of a casing or barrel 4, in which is arranged a plunger 5, adapted to engage spring-brushes or contact-points 6 when the door is closed and to be retracted from engagement with said brushes by springs 7 upon the opening of the door.

The safe, vault, or other structure is preferably composed of two thicknesses of metal 8 and 9, the adjacent surfaces of which are entirely separated by an insulating substance 10 of any description.

The circuit-controlling mechanism is placed within the strong box 11, which in turn is preferably placed in the safe, vault, or other structure, and comprises the electromagnets 12 13 14 15, having a uniform high resistance, and an automatic circuit-controller 16, preferably in the form of an electric clock, which is designed to open and close the circuit at predetermined intervals and which I have conventionally illustrated by showing a disk 17, having studs 18, which are adapted to engage contact-points 19 and 20 during a portion of its revolution, and thereby completing the circuit. Any desired form of circuit-controller may be used without departing from the spirit of the invention; but that shown and described in my application Serial No. 116,811 is preferred.

21 denotes the primary signal-box, and 22 denotes the auxiliary signal-box, of which latter there may be any desired number. The primary signal-box is preferably located at police headquarters and the auxiliary box or boxes located at any desired place or places—as, for instance, when there is but one auxiliary box employed it may be secured to the front or other conspicuous point of the building in which the safe or vault is located.

The primary signal-box is provided with a cover (not shown) and incloses a double-balanced electromagnet 23, each side of which has a uniform high resistance corresponding with that of the electromagnets 12, 13, 14, and 15.

24 and 25 denote the armatures of the electromagnet, and 26 and 27 denote their springs, the latter of which is set to exert a greater pull upon its armature than the former.

28 denotes a post rising from the base of the electromagnet and provided with cross-arms 29 and 30, which are electrically connected to said post.

31 and 32 denote contact-points carried by the arms 29 and 30, respectively, which contact-points are engaged by the armature 25. 33 and 34 denote a similar set of contact-points, the former being electrically connect-

ed to the cross-arm 29 and the latter being connected to but insulated from the cross-arm 30. These contact-points 33 and 34 are adapted to be engaged by the armature 24.

35 denotes an electromagnet of comparatively low resistance, also arranged within the signal-box; 36, its armature; 37, its audible electric signaling device in the form of a bell, and 38 a visual signaling device in the form of a lamp, which is arranged to flash rays of light by the vibration of the bell clapper or hammer.

The auxiliary signal-box 22 is equipped substantially the same as the signal-box 21, and the same reference-numerals, with the exception that they have been primed, are applied to the corresponding parts.

39 denotes a switchboard; 40, a switch; 41, fuses; 42, an electromagnet; 43, its armature; 44, a contact-point for the armature, and 45 and 46 resistance devices, preferably in the form of lamps in series, which have different degrees of resistance. The switchboard may be located at any convenient place in the building within which the safe is located.

47 denotes the main-line closed circuit, preferably tapped to an electric-light line. One side of the circuit is denoted by the numeral 48 and the other side by the numeral 49. The side 48 passes through the switch 40, one of the fuses 41, and through the lamps 45 and 46 to the electromagnet 42, and the other side passes from the electromagnet 42 through the other fuse and through the switch.

50 denotes the feed-circuit, and 51 and 52 denote the opposite sides of said circuit. The sides 51 and 52 of the feed-circuit are connected to the sides 48 and 49 of the main-line circuit at *a* and *b*, respectively, and by connecting these sides of the feed-circuit at these points of the main-line circuit the voltage is materially reduced in the feed-circuit.

I will now proceed to trace both sides of the feed-circuit. Beginning at point *a*, the side 51 of the feed-circuit leads through the double-balanced electromagnet 23, and if an auxiliary signal-box is employed leads through the double-balanced electromagnet 23'. From this magnet the other side 52 of the circuit 50 leads to one of the contact-points 6, and when the door of the safe, vault, or other structure is closed through the plunger 5, thence through the opposite contact-point 6, thence through the electromagnets 14 13, thence through the armature 12^a of the magnet 12, thence through the contact-point 12^b of said magnet, thence through the electromagnet 12, and thence to the point *b*, where it joins the main-line circuit. Should the current on the electric-light line to which the main-line circuit 47 is connected be reduced or entirely destroyed, if provision were not made the alarm would be given at police headquarters, and when an auxiliary signal-box is used at the point where the box is located and to prevent this false alarm I provide an auxiliary local circuit 53, which if the voltage has been materially reduced on the main-line circuit or the current entirely cut off from said main-line closed circuit will supply the feed-circuit with a current of a voltage corresponding to that supplied by the main-line closed circuit until the main-line closed circuit has been restored to normal condition, at which instant the circuit 53 will be automatically cut out.

53^a and 53^b denote the opposite sides of the local circuit 53, the side 53^a extending from one pole of the battery to and connecting with the side 51 of the circuit 50 at the point *c*, while the side 53^b extends from the opposite pole of the battery and connects with the contact-point 44. Assuming the electromagnet 42 to be in the position shown in Fig. 1 of the drawings, with the main-line circuit passing through said electromagnet, should the voltage be reduced in the main-line circuit or the current entirely cut off the instant of this reduction in voltage or break in the current the armature 43 of the electromagnet 42 will be released from said magnet by a spring 44^a and simultaneously make contact with the point 44, thus completing the local circuit 53, which will then be used for supplying the feed-circuit. Of course in localities where there are no electric-light circuits the main-line circuit may be entirely dispensed with and the feed-circuit be connected directly with the local circuit 53.

54 and 55 denote the wires of a shunt-circuit, the wire 54 being connected at one end to the contact-point 19 of the circuit-controller and at the other end to the feed-circuit at the point *e*, while the wire 55 is connected at one end to the contact-point 20 and at its other end to the feed-circuit at the point *f*.

The armature 15^a of the electromagnet 15 is branched into the shunt-circuit by the wires 55^a and 54^a, such wires constituting what I will term for convenience of reference the "branch shunt-circuit."

56, 57, and 58 denote switch-circuits, the wire 56^a being connected at one end at the point *g* to the wire 55^a of the branch shunt-circuit and at the other end to one element of a push-button 56^b or other form of switch, while the wire 56^c is connected at one end at the point *h* to the wire 54^a of the branch shunt-circuit and at the opposite end to the other element of the switch 56^b.

The wire 57^a of the switch-circuit 57 is connected at one end at the point *l* to the feed-circuit and at the other end to one element of a switch 57^b, while the wire 57^c of said switch-circuit 57 is tapped into the feed-circuit at the point *m*.

The wire 58^a of the switch-circuit 58 is connected at one end to the point *j* of the feed-wire and at the other end to one element of a switch 58^b, and the wire 58^c of said switch-cir-

cuit 58 is connected at one end to the shunt-circuit at the point *k* and at the opposite end to the other element of the switch 58^b.

59 denotes what I shall for convenience term a "vault-lining circuit," the wire 59^a of which is connected at one end to the wire 57^c at the point *n* and connected at the other end to the thickness 8 of the safe or vault, while the wire 59^b of said circuit is connected at one end to the opposite thickness 9 of the safe or vault and at the other end is connected at the point *o* to the feed-circuit.

A person attempting to gain entrance to the safe or vault by boring through the walls thereof will, as the bit or tool passes from one thickness of metal into the other, short-circuit the line in a manner to be hereinafter explained.

60 denotes a door shunt-wire, one end of which is tapped to the wire 58^c at the point *p* and the other end of which is connected to the armature of the magnet 13, and when said armature is demagnetized leads from the contact-point 13^a and is connected to the armature of the magnet 14 and when said armature of the magnet 14 is magnetized leads from the contact-point 14^a to the magnet 15 and from the magnet 15 taps into the feed-line at the point *q*.

61 denoted the electric-light circuit for the lamp 38, one side 61^a of the circuit extending from the source of electrical energy or supply through the lamp to the contact-point 61^b, while the other side extends from the source of electrical supply to the armature 36 of the magnet 35.

62 denotes the alarm-circuit. The side 62^a after leaving the bell is connected to the post 28, and the side 62^b after leaving the battery passes through the electromagnet 35 and is provided with branches 62^c and 62^d, the former of which is connected to the armature-post 63 and the latter of which is connected to the armature-post 64.

When an auxiliary signal-box is employed, it is of course understood that it is equipped in substantially the same manner as a primary signal-box, and in order to avoid repetition no detailed description of the parts contained in said auxiliary signal-box is made, the parts in said auxiliary box that correspond with those in the primary box being indicated by the same numerals as those used to designate the parts in the primary box, but primed.

Assuming the parts to be in the position shown in Fig. 1, should the lead-wire be cut, short-circuited, or grounded at any point the magnet 12 will become deënergized, allowing the armature to drop back, opening the circuit between contact-point 12^b and armature 12^a, thus allowing the magnets 13 and 14 to also become deënergized. The path of the feed-circuit is open and one side of the double-balanced electromagnet deënergized and its armature 24 released, allowing said armature to contact with the point 33, which completes the bell-circuit 62 and allows the alarm to be given. Upon deënergizing said magnet the circuit is completed between post 64 and the electromagnet 35 of the bell-circuit, thus causing the armature 36 of said magnet 35 to rapidly pulsate or vibrate and complete the electric-light circuit 61, and thus cause the rapid flashing of the lamp 38, and if auxiliary signal-boxes are employed like action takes place in each, which will be maintained until the currents have been restored to their normal condition, as will be hereinafter described. Should a current of electricity from any other source be introduced into the feed-circuit for the purpose of holding the armature 24 to its magnet, and thereby enter the safe, vault, or other structure without notifying headquarters, the armature 25 of the double-balanced electromagnet will be drawn down on the poles of its magnet, thus completing the circuit through the contact-point 32, the armature-post 63, wire 62^c, and the bell-circuit, when the bell will be sounded and the lights displayed in the same manner as when the armature 24 is released from its magnet. If more than one auxiliary box is employed, the same action will take place in each, and in either event the alarm will be given and the signal be displayed until the parts are restored to their normal position, which can only be done by a properly-authorized person entering the safe, vault, or other structure and resetting the parts in the manner hereinafter to be explained.

When the feed-wire is cut, short-circuited, or grounded at any point, the magnets 12, 13, and 14 are instantaneously demagnetized, allowing the feed-circuit to be broken between the contact-point 12^b and the armature 12^a of the magnet 12, thus cutting off the supply of current to the signal-boxes. The signals, both audible and visual, will now operate, and thus indicate that the wires are being tampered with.

To reset the system, the safe is entered and the switch 58^b is closed to short-circuit the break at the door. Switch 57^b is then closed and magnet 12 thereby energized, whereupon 57^b is immediately reopened. Switch 56^b is then closed, short-circuiting magnet 13 and creating a path through magnet 15. Switch 58^b is then opened, thus causing current to pass through 15, causing it to draw up its armature, thus shunting switch 56^b. Then 56^b may be opened and the operator pass out. The door may then be closed, short-circuiting magnet 15, thus permitting its armature to recede, breaking the short circuit around 13, and thus causing the current to take its normal course.

Should a person attempt to force an entrance to the safe, vault, or other structure by boring thereinto, when the drill or tool passes through one of the thicknesses and contacts with the other thickness the electromagnet

12 will be short-circuited, thus allowing it to become deënergized and the armature 12^a to be released, thus breaking the feed-circuit and giving the signal to headquarters.

To reset the parts to their normal positions, the switches 56^b, 57^b, and 58^b are operated in a manner as hereinafter described.

In the regular operation of the system the circuit-controller operates at predetermined intervals of time to move its contact-points 18 into engagement with the contact-points 19 and 20, and as the contact-points 18 are moving in engagement with the contact-points 19 and 20 the shunt-circuit is completed between points *e* and *f* on magnet 13, thus allowing magnet 13 to deënergize and its armature to make contact with the point 13^a and permitting of the opening of the safe-door without making an alarm at headquarters. The door may be opened any time while the contact-points 18 are in engagement with the contact-points 19 and 20, it being assumed, for instance, that it takes the contact-points 18 one hour to pass from engagement with the contact-points 19 and 20, which will thus allow the safe to be opened any time during that hour. However, the instant the contact-points 18 have moved out of engagement with the contact-points 19 and 20 the feed-circuit is restored to its normal condition, as is also the armature of the magnet 13. If the door be opened when the contact-points 18 are in engagement with the contact-points 19 and 20, the magnet 15 is energized, causing its armature to be drawn against contact 15^b, and the branch shunt-circuit is completed on magnet 13, thus keeping magnet 13 deënergized until the door is again closed, and thus preventing the giving of a signal after the contact-points 18 have passed by and from the contact-points 19 and 20.

At the close of business-hours the door of the safe, vault, or other structure is closed. The current then has two paths on the feed-circuit, one through the circuit-connector 3 to point *g* and one from point *k* to wire 58^c, through wire 60 to armature of magnet 13, thence through contact-point 13^a to armature of magnet 14, thence through contact-point 14^a to magnet 15, thence to feed-circuit at point *q*. The resistance of the first path being less than the resistance of the second path, the magnet 15 is thus deënergized, allowing branch shunt-circuit to be opened through the contact-point 15^b and armature 15^a, thus allowing magnet 13 to reënergize and restore the system to its normal condition.

From the foregoing description, taken in connection with the accompanying drawings, it is thought that the construction, mode of operation, and advantages of my improved protective system will be readily apparent without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric safe protective system, the combination with the feed-circuit of a double-balance magnet included in said circuit, a bell-circuit, an electromagnet installed in the bell-circuit, an electric-light circuit electrically connected to the contact-point and armature of the last-named electromagnet, and branch wires from the bell-circuit including circuit-makers controlled by the movements of the armatures of the double-balanced magnets.

2. In an electric safe protective system, the combination with the feed-circuit, of a signal device installed within said circuit, a main-line circuit, an electromagnet installed in the main-line circuit, said feed-circuit being tapped into the main-line circuit, resistances tapped into the main-line circuit at points to reduce the current in the feed-circuit, and a local circuit, one side of which is separated from one side of the feed-circuit by a contact-point and the armature of said magnet and the other side of which is connected to the opposite side of the feed-circuit, whereby when the main-line circuit is broken, or the current reduced, the armature of the electromagnet will be released and will connect the local circuit with the feed-circuit and retain the signaling device in normal position until the main-line circuit has been restored to its normal condition, substantially as specified.

3. In an electric safe protective system, the combination with the feed-circuit; of a signal device installed within said circuit, magnets 12, 13, 14 located within the safe and in series and installed within the feed-circuit, a shunt-circuit tapped into the feed-circuit, an automatic circuit-controller for the shunt-circuit, whereby at predetermined intervals, governed by the automatic circuit-controller, the feed-circuit will be shunted from the signal device, substantially as specified.

4. In an electric safe protective system, the combination with the feed-circuit; of an electric signal device installed within said circuit, a strong box adapted to be placed within the safe or vault to be protected, electromagnets 12, 13, 14 and 15 located within the strong box, the magnets 12, 13 and 14 being in series, a circuit-connector installed within the feed-circuit to make and break the circuit upon the opening of the door of the safe or vault, a shunt-circuit tapped into the main circuit, an automatic circuit-controller for closing said shunt-circuit, and a door shunt-wire tapped into the feed-circuit at one side of the circuit-connector and extending through the contact-points of magnets 13 14 and through magnet 15 and tapped into the feed-circuit at the other side of the circuit-connector, substantially as set forth.

5. In an electric safe protective system, the combination with the feed-circuit; of an elec-

tric signal device installed within said circuit, a safe composed of insulated thicknesses, a strong box installed within said safe, electromagnets 12, 13, 14 and 15 carried by the strong box, the magnets 12, 13 and 14 being in series, a circuit-connector installed within the feed-circuit to make and break the circuit upon the opening of the door of the safe or vault, a shunt-circuit tapped into the main circuit, an automatic circuit-controller for closing said shunt-circuit, a door shunt-wire tapped into the feed-circuit at one side of the circuit-connector and extending through the contact-points of magnets 13 14 and through magnet 15 and tapped into the feed-circuit at the other side of the circuit-connector, a vault or safe lining circuit, switch-circuits for resetting the electromagnets, and a branch shunt-circuit connecting one of the switch-circuits with the shunt-circuit, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH WEATHERBY, JR.

Witnesses:
J. CHESTER WILSON,
V. V. SHOCKLEY.