(No Model.)

2 Sheets—Sheet 1.

C. H. SHAFFER.

ELECTRIC ALARM.

No. 452,735. Patented May 19, 1891.

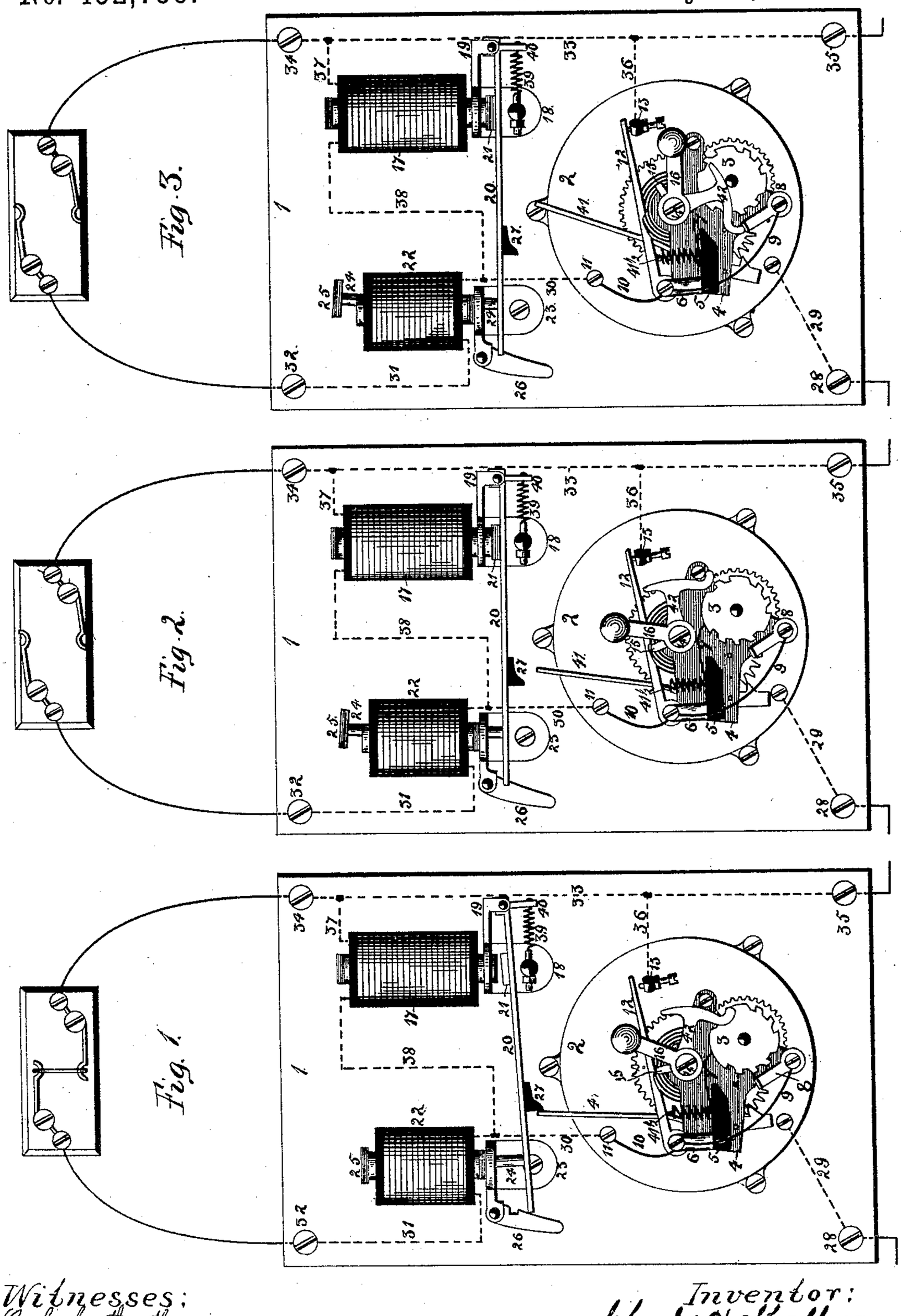

Fig. 3.

Fig. 2.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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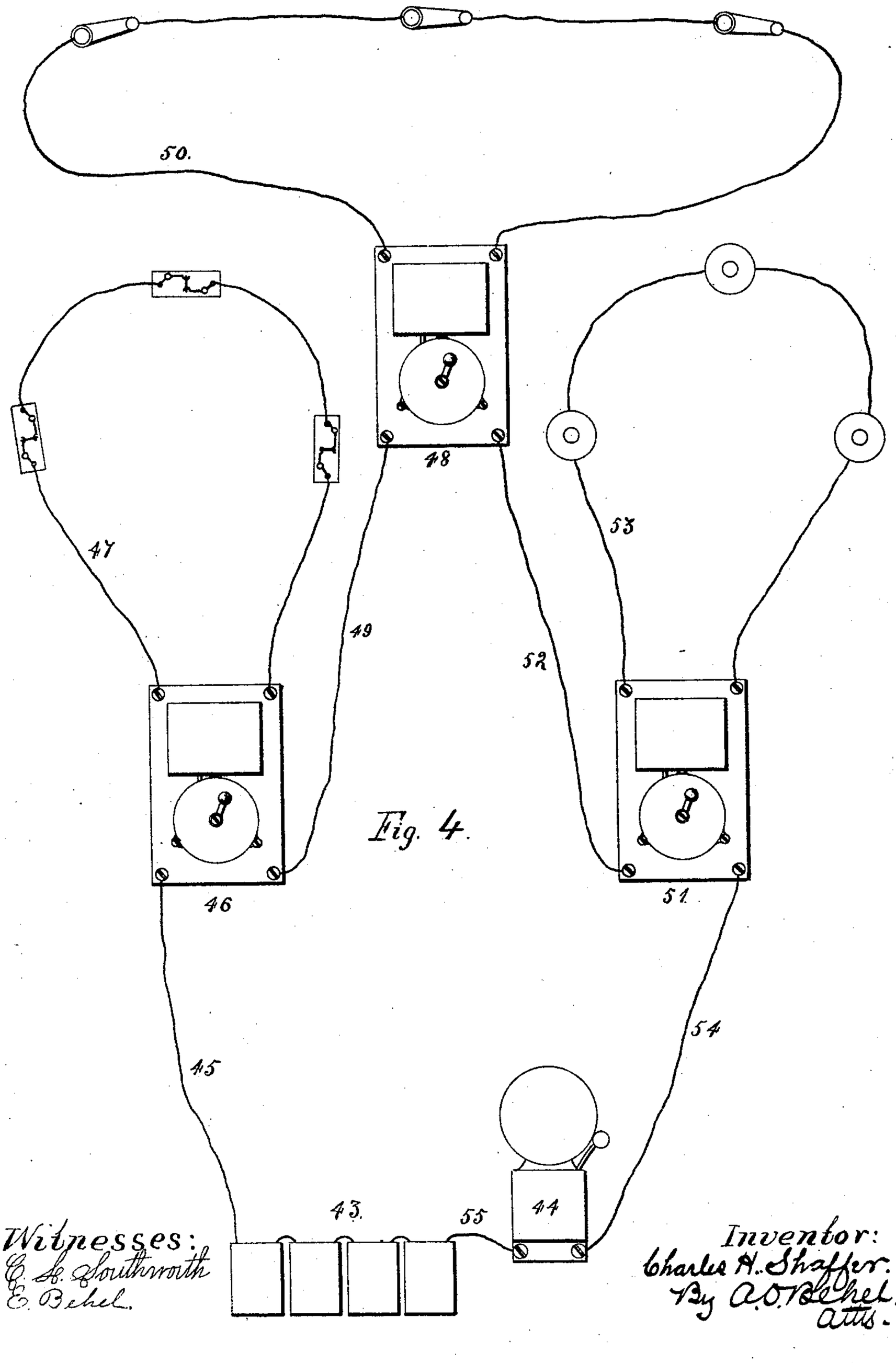

Fig. 4.

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UNITED STATES PATENT OFFICE.

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ELECTRIC ALARM.

SPECIFICATION forming part of Letters Patent No. 452,735, dated May 19, 1891.

Application filed May 5, 1890. Serial No. 350,655. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. SHAFFER, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Electric Alarms, of which the following is a specification.

This invention relates to an alarm system operated upon what is known as a "closed circuit."

The object of this invention is to construct a box for giving alarm-signals, so that a single battery will supply the energy for starting the box and giving the signal.

In the accompanying drawings, Figure 1 represents my signal-box with its parts in their normal position. Fig. 2 represents the various parts of the signal-box in the position they occupy immediately after the movement of the box has been released. Fig. 3 represents my signal-box in the position its parts occupy after the signal has been given and the movement of the box is at rest. Fig. 4 represents a series of my boxes placed in circuit with a battery and alarm-bell, showing the different uses to which my box is capable.

To the base-board 1 of the box is secured a signal-box 2, of a well-known construction in so far as the train of gearing and their supports are concerned. The break-wheel 3 is so mounted as to be rotated by the clock-work of the box. To the upper surface of the plate 4 of the clock-work is secured a block 5 of insulating material, and from which projects a post 6, which has a connection with a spring-arm 7, which rests on the periphery of the break-wheel 3 when the box is at rest. A plate 8 is insulated and has a connection with the supporting-frame 4 of the clock-work and has its free end upturned. This plate has a connection with the post 6 by a wire 9, and a wire 10 connects the post with the base-plate of the signal-box, but insulated therefrom, as at 11. At the free end of the post 6 is pivoted an arm 12, and near the free end of this arm is located a post 13, which is secured to but insulated from the base-plate of the box. To the center shaft 14 of the box is secured an arm 15 and a handle 16, which revolve in unison. To one side of the signal-box and some distance above it is located an electro-magnet 17, which is held in position on the base-board 1 by a bracket 18, secured thereto. From this bracket project arms 19, between which is pivoted an arm 20, which carries an armature 21, so located as to be operated upon by the electro-magnet. This arm 20 extends some distance beyond the electro-magnet 17, and near its free end is located an electro-magnet 22, which is held in place on the base-board 1 by a bracket 23, secured thereto. To this arm 20 near its free end is secured a rod 24, which passes between the coils of the electro-magnet and has an armature 25 secured to its free end. To the bracket 23 is pivoted a catch-lever 26, and on the underside of the arm 20 is secured a block 27 of insulating material.

In the above description I have briefly stated the various parts composing the operating mechanism of my improved box. Their connections with each other and operations will now be described.

To one of the lower corners of the base-board 1 of the box is secured a binding-post 28, and to which is secured one of the wires forming a portion of the electric circuit in which the box is included. From this post extends a wire 29, which has an electrical connection with the base of the signal-box. From the post 11 a wire 30 extends to one of the coils of the electro-magnet 22, and from the other coil of the electro-magnet a wire 31 is connected to the binding-post 32. A wire 33 connects binding-posts 34 and 35, and a wire 36 connects the post 13 with the wire 33. One coil of the electro-magnet 17 is connected with the wire 33 by the wire 37, and the other coil has a connection with the wire 30 by a wire 38. From the binding-posts 32 and 34 extends the alarm-circuit, which in Figs. 1, 2, and 3 I have shown as a closed-circuit thermostat of a pattern patented to me, and which may be of any of the known constructions.

At Fig. 1 is shown my box with its various parts in their normal position, and the circuits through the box are as follows: from the post 28 by wire 29 to the signal-box, through the break-wheel device to the post 6, or through the cam-arm 15 and arm 12 to the post 6, thence by wires 10 and 30 through the electro-magnet 22, thence by wire 31 to post

32, thence through the alarm-circuit, in which is included the thermostat, to post 34, and by wire 33 to post 35, from which posts extend the outside circuit-wires, which extend to a distant station, in which is included a battery and alarm device, and the circuit is completed by being connected to post 28. The electro-magnet 17 is in a shunt-circuit by the wire 37, connected to wire 33, and wire 38, connected to the wire 30. The electro-magnet 22 is constructed with less resistance than the electro-magnet 17. Therefore a greater portion of the current will travel through the electro-magnet 22. It will be seen that I have a direct current through the electro-magnet 22 and a shunt-circuit through the electro-magnet 17. The influence of the electro-magnet 22 is to hold the arm 20 downward by its influence upon its armature 25, while the influence of the electro-magnet 17 is to raise the arm 20 upward, and as the electro-magnet 17 is of greater resistance than the electro-magnet 22 it cannot overcome the force exerted by the electro-magnet 22. I have applied a spring device 39, having one end connected to a stationary support and its other end connected to an arm 40, depending from the arm 20, by means of which the weight of the arm can be regulated to suit the strength of the electro-magnet 17.

It will be seen that when the system is in order, as shown at Fig. 1, an arm 41, which has a connection with the pallet of the escapement device of the clock-work, will engage the block 27, secured to the under side of the arm 20, and so long as the arm 20 remains in such position the clock-work will be wound up, and when an abruption of the thermostat-circuit occurs—for instance, by the action of heat—will cause the electro-magnet 22 to release its influence upon the arm 20 and compel the current of electricity to pass through the shunt electro-magnet 17, thereby exerting its influence upon the armature 21, and consequently raising the arm 20, the free end of which will engage the catch-lever 26 and be held elevated. This movement of the arm 20 will release the arm 41 of the clock-work, which will allow the clock-work to rotate its various parts. Just after the clock-work has started the cam-arm 15 will have moved sufficiently to allow the free end of the arm 12 to come in contact with the post 13, thereby forming a direct circuit through the box by way of wire 36 and substantially cutting out the resistance of electro-magnet 17, and the spring 41½ will insure a good contact between the arm and post, as shown at Fig. 2, which also shows the thermostat-circuit open. As the clock-work revolves, the break-wheel 3 will also revolve, and the notches in the wheel will cause a break in the main circuit every time the spring-arm 7 enters one, thereby causing a signal to be transmitted to a distant station, which corresponds to the number and location of the notches in the periphery of the break-wheel. After the signal has been transmitted an arm 42, secured to the center shaft 14 of the clock-work, will engage the plate 8, thereby making a direct circuit through the box to the post 6. There will also be a circuit with the post 6 by way of the break-wheel 3 and spring-arm 7 and from the post through the arm 12 and wire 36 to the post 35 and onto the main line, as shown at Fig. 3.

In order to set the box in condition for use, the thermostat-circuit must be closed by repairing the break, the arm 41 of the clock-work is moved to the left-hand side of the box, and the arm 20 released from its engagement with the catch 26, when, so far as these parts are concerned, they will occupy the position shown at Fig. 1. By means of the handle 16 the clock-work is wound up and the cam-arm 15 will raise and hold the arm 12 from its engagement with the post 13, thereby breaking the direct circuit through the box, and all the parts will occupy their former or normal positions, as shown at Fig. 1. The circuit will then go through the box, electro-magnet 22, thermostat-line to post 35, and through the outside circuit, as before set forth, when the box will be ready for giving another alarm.

At Fig. 4 I have shown a series of the boxes above described in a single circuit, and in which I have included a single battery 43 and alarm-bell 44. From the battery, which may be located at any point on the circuit, runs a wire 45 to an alarm-box 46, through the box and thermostat-circuit 47 back to the box, and to the next box 48 by wire 49, through this box and through a switch-line 50, in which are located any number of switches for breaking the circuit, back to the box and to the next box 51 by wire 52, through this box and through a line 53, in which are located any number of closed-circuit push-buttons, back to the box, and through bell 44 by wire 54 and to battery 43 by wire 55. Thus we have a complete closed circuit, in which are included three of my improved boxes and their alarm-circuits, a battery, and an alarm-bell. Upon the breaking of any one of the alarm-circuits the clock-work of the box for that one alarm-circuit will be released and turn in its alarm without releasing any of the remaining boxes, and by referring to Figs. 1, 2, and 3 it will be seen that when the alarm has been given the alarm-circuit for that box will be completely cut out, thereby giving a direct circuit through the box. These boxes may be located outside of the building to be protected or in some place where fire will not likely occur, thereby giving ample protection to the remaining boxes in the circuit.

I am able by this system of boxes and upon a single circuit to automatically turn in an alarm when the temperature of the building rises to a certain degree; to give an alarm should an entrance be forced into a building—in other words, a burglar-alarm—and to call assistance by means of a closed-circuit push-button, and all that is necessary to give an alarm is to break the alarm-circuit of any one

of the boxes and the arm 20 will be instantly acted upon, as before described. Even if the alarm-circuit should be instantly closed after giving the alarm, as will be the case in using closed-circuit push-buttons, it will be too late, for when the box is once started it cannot be stopped until the signal has been completed. Should the battery run down or the main circuit outside of the boxes become broken, it will not start any one of the boxes, as the only thing that can start them is a break in the alarm-circuit.

It is evident that in place of the alarm-bell 44 any of the known devices for receiving an alarm by the make and break of the circuit may be employed without departing from the gist of my invention. It is not absolutely necessary that a short circuit should be made through the box by lever 12 and post 13, for if battery force enough be employed the current can traverse the shunt electro-magnet 17 and accomplish the same result; and when closed-circuit push-buttons are employed, or switch-levers which are closed upon giving the alarm, the current can have its original circuit through the alarm-circuit, thereby doing away with the short circuit through the box; but I prefer to use the short circuit, as I am able to maintain a system of alarms on much less battery-power than would otherwise be required.

I am aware that the signal-box could be released by the same battery-current that transmits the signal without an absolute break in the alarm-circuit. This might be accomplished either by introducing sufficient resistance into the alarm-circuit, thereby compelling sufficient current to traverse the shunt electro-magnets, which would raise the arm 20 and release the box, or at each thermostat, switch, or push-button is introduced a short circuit of great resistance, and when the main alarm-circuit is broken there would still be a current passing through the short circuit, which in effect would be the same as introducing extra resistance in the line.

It is evident that any number of batteries can be employed on the circuit, distributed at proper intervals, which would be equal to a single battery located at one point and would be the same in operation; and by "single battery" I do not mean a single cell, but one or more cells located in the same circuit.

I claim as my invention—

1. In combination, a closed circuit a portion of which is an alarm-circuit, a signal-box in the main portion of the closed circuit, an electro-magnet in the alarm-circuit preventing the starting of the box, and an electro-magnet shunting the alarm-circuit, which starts the box when sufficiently energized by breaking or increasing the resistance of the alarm-circuit, each of said electro-magnets being of different resistance, substantially as set forth.

2. In combination, a closed circuit a portion of which is an alarm-circuit, a signal-box in the main portion of the closed circuit, an armature, an electro-magnet in the alarm-circuit exerting its influence upon the armature to prevent the starting of the box, and an electro-magnet shunting the alarm-circuit, being normally of greater resistance than the electro-magnet in the alarm-circuit and starting the box by actuating the armature when sufficiently energized by breaking or increasing the resistance of the alarm-circuit, substantially as set forth.

3. In combination, a closed circuit a portion of which is an alarm-circuit, a signal-box in the main portion of the closed circuit, an armature, an electro-magnet in the alarm-circuit having a direct contact with the armature, and an electro-magnet shunting the alarm-circuit, being normally of greater resistance than the alarm-circuit and starting the box when the electro-magnet in the alarm-circuit releases its hold upon the armature, substantially as set forth.

4. In combination, a closed circuit a portion of which is an alarm-circuit, a signal-box in the main portion of the closed circuit, an electro-magnet in the alarm-circuit, an electro-magnet shunting the alarm-circuit, an armature common to both electro-magnets, said electro-magnets located at different distances from the pivot of the armature, one of said electro-magnets exerting its influence upon the armature to prevent the starting of the box and the other electro-magnet exerting its influence upon the armature to start the box, substantially as set forth.

5. In combination, a closed circuit a portion of which is an alarm-circuit, a signal-box in the main portion of the closed circuit, an electro-magnet shunting the alarm-circuit, an armature for the electro-magnet when in its normal position preventing the starting of the box, and a pivoted catch which holds the armature when actuated by the electro-magnet, substantially as set forth.

6. In combination, a closed circuit a portion of which is an alarm-circuit, a signal-box in the main portion of the closed circuit, an electro-magnet shunting the alarm-circuit and being of greater resistance than the alarm-circuit, and an arm actuated by the box after being started for cutting out the resistance of the electro-magnet, substantially as set forth.

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