

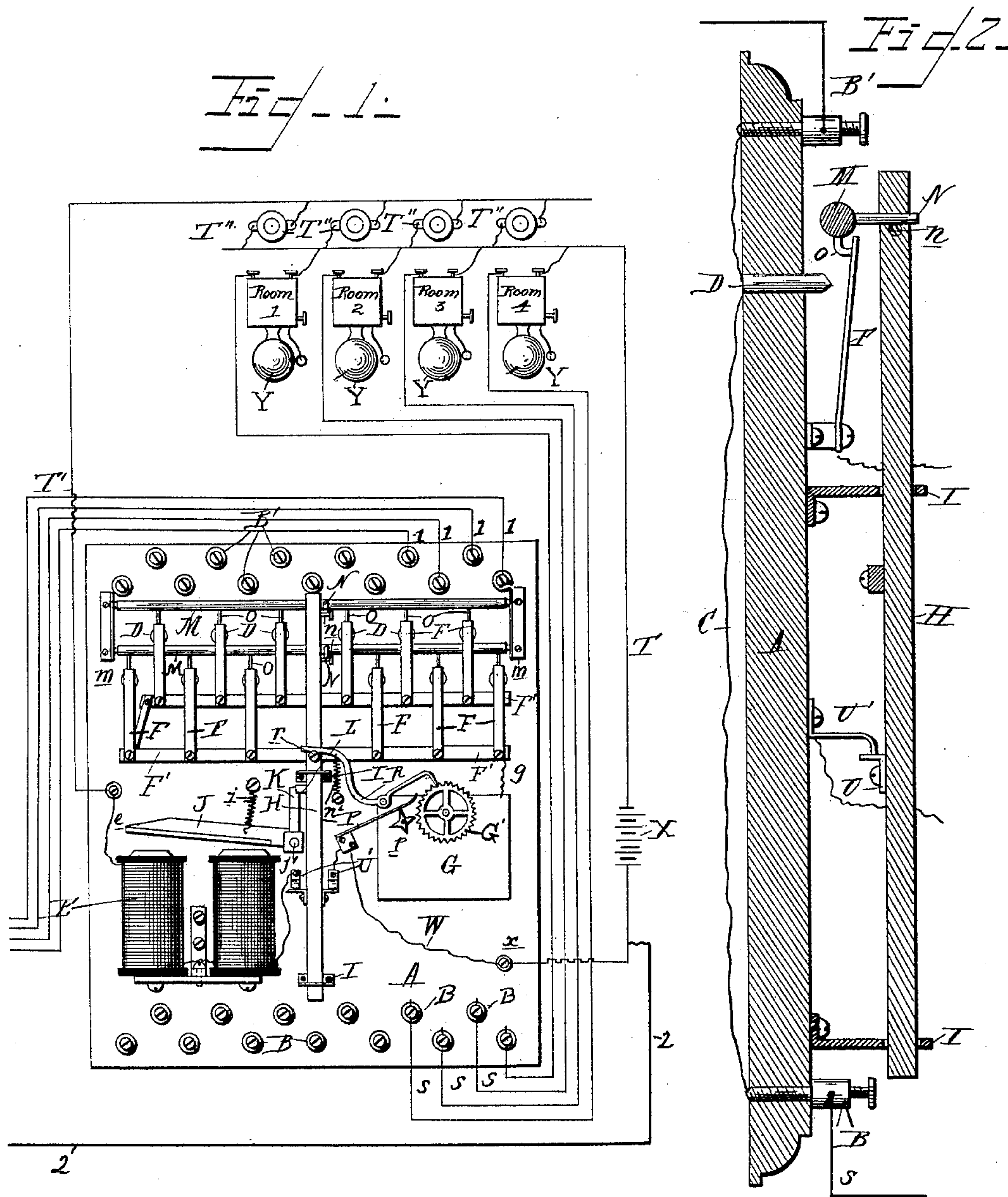
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3 Sheets—Sheet 1.

C. A. & J. F. COX.  
AUTOMATIC FIRE ALARM.

No. 424,860.

Patented Apr. 1, 1890.



Witnesses

*Wm. T. Robertson*

*Thos. E. Robertson*

By their Attorney

Inventors.  
*Charles A. Cox,*  
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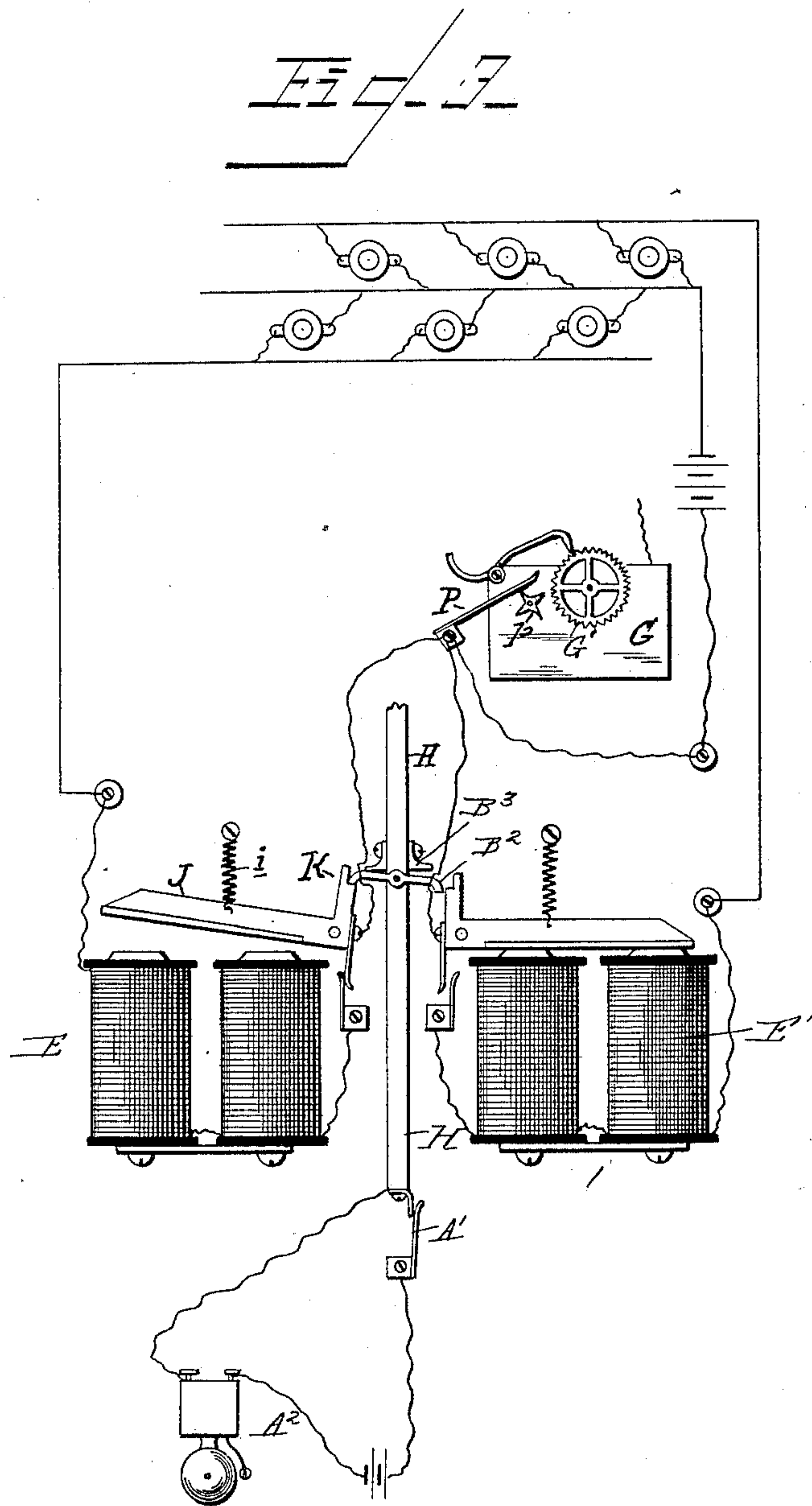
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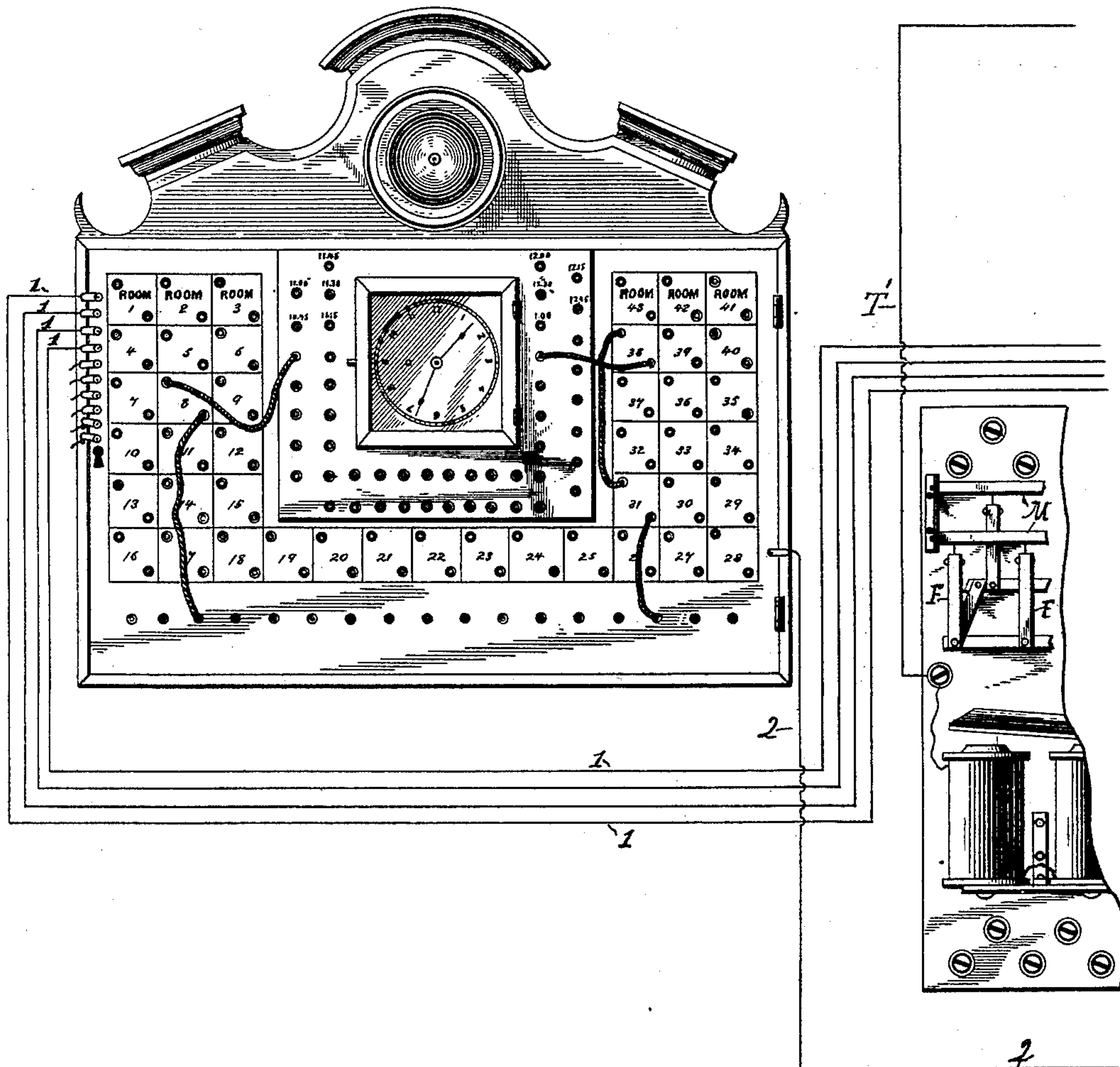
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Fig. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

CHARLES A. COX AND JOSEPH F. COX, OF LOUISVILLE, KENTUCKY.

## AUTOMATIC FIRE-ALARM.

SPECIFICATION forming part of Letters Patent No. 424,860, dated April 1, 1890.

Application filed October 11, 1889. Serial No. 326,687. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES A. COX and JOSEPH F. COX, citizens of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Automatic Fire-Alarms, of which the following is a specification, reference being had therein to the accompanying drawings.

Our improvement has reference to automatic fire-alarm devices for hotels, factories, asylums, apartment-houses, and like service; and it consists in the construction, arrangement, and combinations of parts hereinafter described, and then definitely claimed, whereby efficient and simple means are provided in case of fire in any one of a series of rooms or apartments to immediately and automatically sound an alarm in all of said rooms or apartments, and thereby indicate the presence of fire in its incipency.

In the accompanying drawings, Figure 1 represents in front elevation the main mechanism forming part of our improvement, the general arrangement of external circuits and alarms being also diagrammatically indicated. Fig. 2 is a transverse sectional view showing a contact-spring, contact-point, and connections on a larger scale, but with parts left out of view to avoid confusion in the drawings. Fig. 3 is a front sectional view illustrating another way of carrying out our invention. Fig. 4 shows how our apparatus may be connected with a "guest-call" or other system of wires.

Referring now to the details of the drawings, A is a plate of some suitable insulating material, which in practice is grooved on its rear face to receive the wire-connections C, (shown in Fig. 2 as being loose at the back of the board to make them more distinct,) extending between the binding-posts B B', said wires being also connected to contact-point D, both binding-posts and contact-points extending through the board. Upon the front face of the plate A is vertically mounted a pair of electro-magnets E, whose coils are connected to the main conductor by the wire *e*. A series of contact-springs F, fastened to bars F' F' and electrically connected to the clock mechanism G by the wire *g*, are also mounted upon the plate A.

At H is shown a slide suitably mounted in supports or bearings I I, secured to the plate A, and whose functions will be hereinafter explained.

J is an armature controlled by the magnet E and normally held out of contact with the same by the spring *i*. This armature is pivotally connected at *j'* to the plate A, adjacent to slide H, and carries above its pivotal connection a vertical arm K, notched at its top to receive the lug L, secured to said slide H.

M M are rods mounted in suitable bearings *m m*, attached to plate A, and provided with lever-arms N N, arranged to bear against pins *n n* projecting from the rod H. Along the rods M M, at right angles to the lever-arm N, and arranged to engage with the contact-springs F, are secured a series of pins O, which normally hold said contact-springs F out of electrical connection with the contact-points D.

G indicates a spring clock-work mechanism of the ordinary character, having a spur-wheel G' and a star-wheel *p*, the points of which, as the wheel revolves, are designed to alternately pass into electrical contact with the spring P, and thereby cause an intermittent ringing of the well-known "make-and-break" alarm-bells Y Y Y Y, one being located in each of the rooms of the hotel or like places above mentioned. By this arrangement we are enabled to provide a fire-alarm service which may readily be distinguished from other bell service that may be employed in connection with this system.

R is a latch-lever, pivoted to the clock-frame, the long end of which is pressed by the spring *n'* against the pin *r*, projecting from the slide H, while the short end engages with spur-wheel G' of the clock mechanism G, thereby preventing running down of the clock.

S S S S are the wire connections attached to the binding-posts B B B B, and are thus connected with the main mechanism and to the alarm-bells Y Y Y Y in the different rooms, as shown, and T is the battery-wire, forming part of the electrical circuit leading from the generator or battery X to the binding-post *x*, which in its turn is electrically connected with the spring P by the wire W.

T' is a wire, extending from one side of the electro-magnets E through the building and



adjacent to the battery-wire T, and in case of fire makes connection therewith through a series of thermostats T'' T'' T'' T'', in a manner well understood.

5 At U' are shown springs secured to the plate A and arranged to electrically contact with the projection U, secured to the under side of the rod H. Binding-posts B' are secured to the upper portion of the plate  
10 A, and are in electrical connection with wires C, Fig. 2, as before mentioned. By this arrangement our improvements may be used in connection with hotel guest-call systems, and thereby obviate the necessity of  
15 additional wiring, &c. When this arrangement is desired, wires 1 1 1 1 (see Fig. 4) lead directly from the main mechanism of a guest-call apparatus (such, for instance, as that shown in our patent, No. 400,750) to the binding-posts B', thence the circuit is completed  
20 through the wires C, Fig. 2, binding-posts B, wires S S S, Figs. 1 and 2, to room alarm-bells, from alarm-bells through wire T to battery X, and thence direct to guest-call by wire 2.  
25 It is to be understood, of course, that the circuits in the guest-call and fire-alarm apparatus are both normally open. As we make no claim to the guest-call in this application, it is unnecessary to describe it further, as it  
30 is only given to show the way it or any guest-call or other system of wires may be connected to our present invention.

In setting our improvement for use we place the plate A with its attached mechanism in the office of the hotel, factory, or other  
35 building in which it may be desired to use it, and set in all the rooms an electrical thermostat of any approved form, all of which thermostats should be connected with the  
40 wires T and T'.

To set our device ready for automatic action, it is only necessary to push the slide H up until the lug L rests on the vertical portion K of the armature J. This upward movement of the slide H brings the projection U  
45 into contact with the springs U', thereby completing the circuit from wire W to the magnets E. The said upward movement of the slide H, by means of the pin r, secures the long end of the latch-lever R against any downward movement, and thereby locks the  
50 clock mechanism, and at the same time the lever-arm N is forced upward, which movement rocks the rod M with its projecting pins O, and the latter in their movement bear against the contact-springs F and raise them out of electric contact with the contact-points  
55 D, as shown in Fig. 2. With the apparatus thus arranged, should an undue amount of heat cause the electrodes of any one of the thermostats to come into contact with each other, the circuit would be completed as follows: from the thermostat through the battery-line T, battery X, wire W, contact-springs  
60 U', electro-magnets E, line T', back to the thermostat. The electro-magnets E being thus energized, the vertical arm K is drawn

away from the lug L by the downward movement of the armature J, and the slide H, being free to move, drops down and by its movement breaks the electric connection at U',  
75 disconnects the latch-lever R from the clock-works G, thus allowing the clock-work to operate and turn the star-wheel and the contact-springs F to come into electric contact with the room terminals or contact-points D,  
80 and thus the electrical connection between the wires C C, leading to the room alarm-bells, and the clock-work G, through the wire g, is closed, and as many circuits are closed by this movement of the slide H and rods M,  
85 combined with the action of the springs F, we call this part of our apparatus a "multiplex circuit-closer." The circuit is thus established as follows: from the contact-springs F through the contact-points D, wires C, binding-posts B, room-wires S S S, to the alarm-bells in the several rooms, thence through the  
90 battery-wire T, battery X, wire W, spring P, to star-wheel p in clock mechanism G, through wire g to contact-springs F, and thus the alarm-bells are sounded in all the rooms automatically and simultaneously. The bells being  
95 run intermittently by the making and breaking of the circuit by the star-wheel p, the fire-alarm may be readily distinguished from that of the guest call-system, if employed in connection with the same. It will be obvious  
100 that when the slide H falls and each movable contact touches the fixed contact all the bells are electrically connected, so as to be operated by a single generator or battery. By the breaking of the circuit at U' the liability of a shunt-circuit through the electro-magnets E is obviated.  
105

It is customary when wiring a building for a bell service to place all the wires in a bunch or cable when running through hallways to the several apartments. Now, if by accident  
110 any of the insulation on one of the lines leading from the thermostats and that on the battery-line should be destroyed, the bare wires may come into electrical contact with each other, which might make an alarm throughout all the rooms and cause much trouble.  
115 To overcome this difficulty, we show in Fig. 3 a double system of electro-magnets and thermostats—that is to say, there are two sets of magnets and armatures in the main apparatus and two thermostats in each room. By  
120 this arrangement if either of the thermostat-lines become "crossed" with the battery-line there will be a "trouble-alarm;" but it will be sounded in the office only.

Referring now to said Fig. 3, E E' are electro-magnets arranged on each side of the slide  
125 H. Instead of the lug L, Fig. 1, being secured to the slide H, a short curved bar B<sup>2</sup>, Fig. 3, is centrally pivoted to the rod H. Slightly above the bar B<sup>2</sup> are secured two brackets B<sup>3</sup>, which serve to limit the movement of the said bar B<sup>2</sup>. Now, if any one of the lines leading from the thermostat should  
130 come into electrical contact with the battery-



line, it would close the circuit through one of the magnets E E', Fig. 3, which would permit the rod H to drop only a small distance, because it is supported on the opposite side by the armature of the magnet that has not been energized. The small distance that the rod thus travels is only sufficient to close the office-bell circuit, as shown at A', Fig. 3, and thus sound a trouble-alarm only on the office-bell A<sup>2</sup> on same figure. The very small distance traveled by the rod, as explained above, is not sufficient to permit the springs F to come into electrical contact with the contact-points D, Fig. 2, and thereby sound a fire-alarm. If a fire occurs, both thermostats act, and thus close the circuit on both magnets E E', Fig. 3, which permits the rod H to drop sufficiently to allow the springs to come into contact with contact-points D, Fig. 2. The wiring for the bells in this system is the same as shown in Fig. 1. The return-wire from each bell is connected to the battery in each system.

If a device containing only one pair of electro-magnets, as illustrated in Fig. 1, is used and an accident, as herein described, should happen to the wires, a false alarm would be sounded, which might prove a serious matter in a crowded house. It will readily be seen that the double system is designed simply to avoid a "general alarm" in the event of accident to the wires, as described.

Having thus shown how we at present prefer to carry out our invention, but without limiting ourselves to the exact construction there shown, we claim as new—

1. The combination of an electric generator, an electro-magnet and its armature, a circuit connecting the magnet and the generator, two or more thermostats and alarm-bells, each bell having a separate electrical connection leading to the main circuit, and each electrical connection having separable contact-points, a multiplex circuit-closer, and a clock-work mechanism constructed and arranged to make and break the circuit several times in succession to operate the alarm-bells intermittently, substantially as described.

2. The combination of an electric generator, an electro-magnet and its armature, a circuit connecting the magnet and the generator, two or more thermostats and alarm-bells, each bell having a separate electrical connection leading to the main circuit, and each electrical connection having separable contact-points, a multiplex circuit-closer, a contact-point leading to the generator, and a clock mechanism having a revolving contact-wheel coacting with said contact-point to make and break the main circuit several times in succession, substantially as described.

3. The combination of an electric generator, an electro-magnet and its armature, a circuit connecting the magnet and the generator, two or more thermostats and alarm-bells, each bell having a separate electrical

connection leading to the main circuit, and each electrical connection having separable contact-points, a multiplex circuit-closer, a contact-point leading to the generator, a clock mechanism having a revolving contact-wheel coacting with said contact-point to make and break the main circuit several times in succession, and a stop, as the lever R, for preventing the clock-work from running until the magnet has been energized, substantially as described.

4. The combination of a series of thermostats, a series of alarm-bells, an electric generator, a magnet energized by said generator, an armature therefor, and intermediate mechanism, substantially as described, constructed and arranged to normally hold the bells out of electrical connection with the battery, an electrical conductor connected with the thermostats and magnets, another conductor connecting the generator and the thermostats, a clock-work mechanism electrically connected with the bells, and means, as the star-wheel p and spring P, for intermittently connecting the clock-work with the generator when one of the thermostats has been excited, substantially as described.

5. The combination, in an electric alarm mechanism, of a series of fixed contact-points electrically connected with a series of alarm-bells, a generator also electrically connected to the alarm-bells, a series of movable contacts, a magnet, an armature therefor, a slide supported by said armature, and a horizontal rod engaging with the vertical slide and having pins holding the movable contacts away from the fixed contacts, substantially as described.

6. The combination, in an electric alarm mechanism, of a series of fixed contact-points electrically connected with a series of alarm-bells, a generator also electrically connected to the alarm-bells, a series of spring-contacts, a magnet, an armature therefor provided with a vertical arm, a slide resting on said arm, a horizontal rod having an arm projecting therefrom resting on the slide, and a series of pins pressing the spring-contacts away from the fixed contacts, substantially as described.

7. The combination, in an electric alarm mechanism, of a series of fixed contact-points electrically connected with a series of alarm-bells, a generator also electrically connected to the alarm-bells, a series of spring-contacts, a magnet, an armature therefor provided with a vertical arm, a slide resting on said arm, a horizontal rod having an arm projecting therefrom resting on the slide, a series of pins pressing the spring-contacts away from the fixed contacts, and a clock-work mechanism for intermittently making and breaking the circuits between the battery and the contacts when the two series of contacts touch each other, substantially as described.

8. The combination, in an electric alarm mechanism, of a series of fixed contact-points electrically connected with a series of alarm-



bells, a generator also electrically connected  
 to the alarm-bells, a series of spring-contacts,  
 a magnet, an armature therefor provided with  
 a vertical arm, a slide resting on said arm, a  
 5 horizontal rod having an arm projecting there-  
 from resting on the slide, a series of pins press-  
 ing the spring-contacts away from the fixed  
 contacts, a spring P in electrical connection  
 with the generator, and a clock-work mech-  
 10 anism in electrical connection with the mova-  
 ble contacts and having a star-wheel whose  
 points make contact with the spring P, sub-  
 stantially as described.

9. The combination, in an electric alarm  
 15 mechanism, of a series of fixed contact-points  
 electrically connected with a series of alarm-  
 bells, a generator also electrically connected  
 to the alarm-bells, a series of spring-contacts,  
 a magnet, an armature therefor provided  
 20 with a vertical arm, a slide resting on said  
 arm, a horizontal rod having an arm project-  
 ing therefrom resting on the table, a series  
 of pins pressing the spring-contacts away  
 from the fixed contacts, a spring P in elec-  
 25 trical connection with the generator, a clock-  
 work mechanism in electrical connection with  
 the movable contacts and having a star-wheel  
 whose points make contact with the spring  
 P, and a stop engaging with one of the wheels  
 30 of the clock-work, substantially as described.

10. The combination, in an electric alarm  
 mechanism, of a series of fixed contact-points  
 electrically connected with a series of alarm-  
 bells, a generator also electrically connected  
 35 to the alarm-bells, a series of spring-contacts,  
 a magnet, an armature therefor provided  
 with a vertical arm, a slide resting on said  
 arm, a horizontal rod having an arm project-  
 ing therefrom resting on the table, a series  
 40 of pins pressing the spring-contacts away

from the fixed contacts, a spring P in elec-  
 trical connection with the generator, a clock-  
 work mechanism in electrical connection with  
 the movable contacts and having a star-wheel  
 whose points make contact with the spring 45  
 P, and a latch having one end engaging with  
 a wheel of the clock-work and the other end  
 supported by the slide, substantially as de-  
 scribed.

11. The combination, in an electric alarm 50  
 mechanism, of a series of fixed contact-points  
 electrically connected with a series of alarm-  
 bells, a generator also electrically connected  
 to the alarm-bells, a series of spring-contacts,  
 a magnet, an armature therefor provided with 55  
 a vertical arm, a slide resting on said arm, a  
 horizontal rod having an arm projecting  
 therefrom resting on the slide, and a series  
 of pins pressing the spring-contacts away  
 from the fixed contacts, and a circuit-breaker 60  
 on the slide to break the connection between  
 the battery and magnet as the slide descends,  
 substantially as described.

12. The combination, in an electric alarm 65  
 mechanism, substantially as herein described,  
 provided with two sets of thermostats and  
 appropriate circuits, and two independently-  
 operating magnets and corresponding arma-  
 tures, each having a vertical arm, of a slide  
 having a pivoted cross-bar resting on said 70  
 arms, substantially as described.

In testimony whereof we affix our signa-  
 tures, in presence of two witnesses, this 8th  
 day of October, 1889.

CHARLES A. COX.  
 JOSEPH F. COX.

Witnesses:

M. N. MULLEN,  
 ROBT. BALLARD.