

(No Model.)

2 Sheets—Sheet 1.

J. R. FRASER, Jr.
ELECTRIC BURGLAR AND FIRE ALARM.

No. 583,644.

Patented June 1, 1897.

Fig. 1.

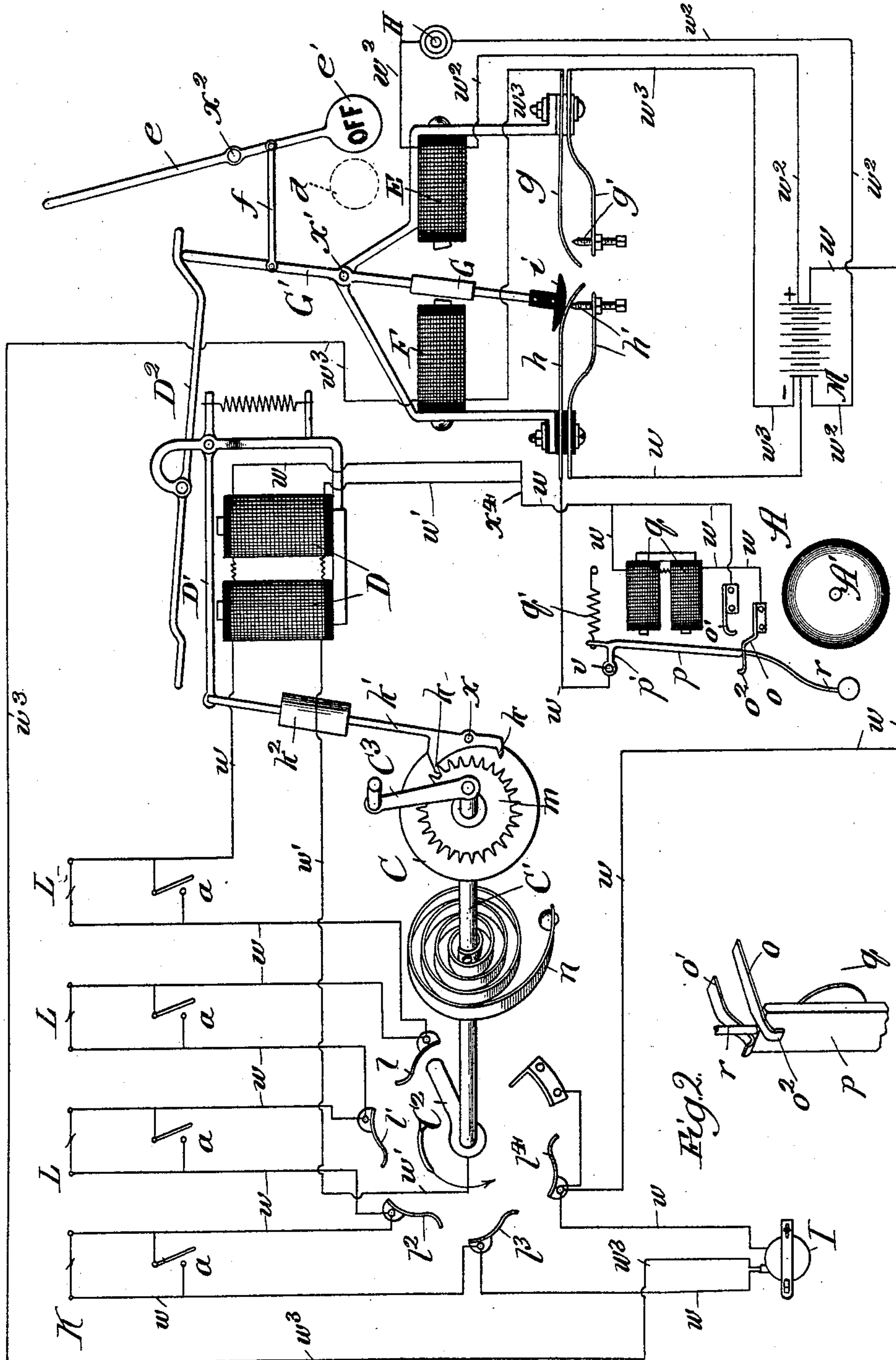
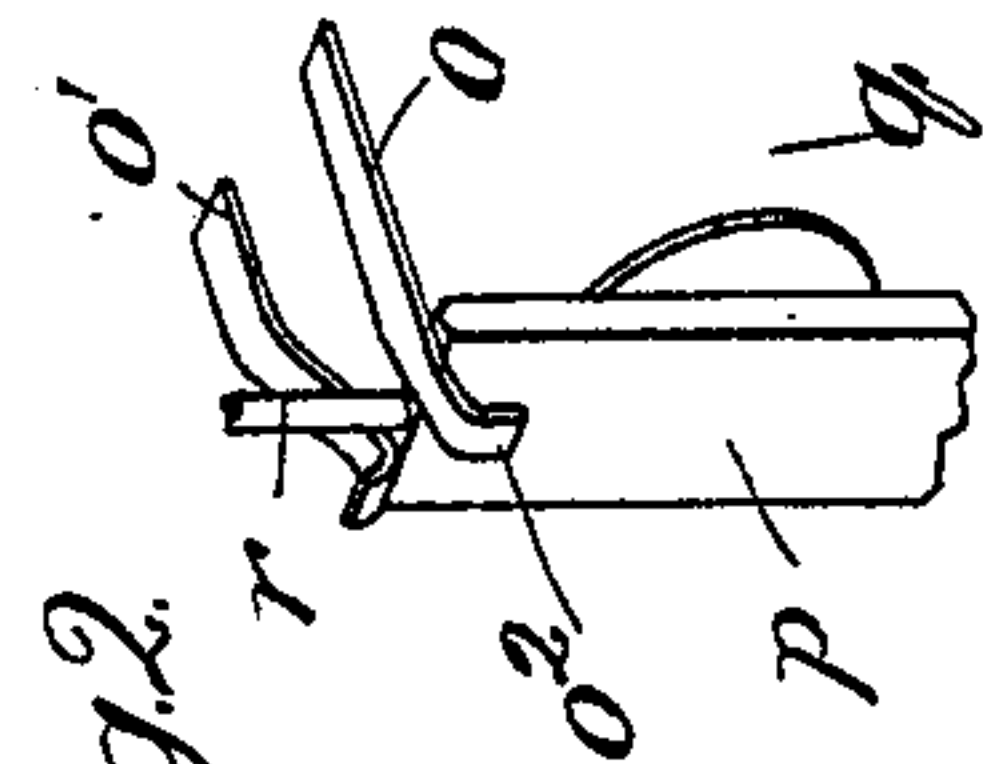


Fig. 2.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

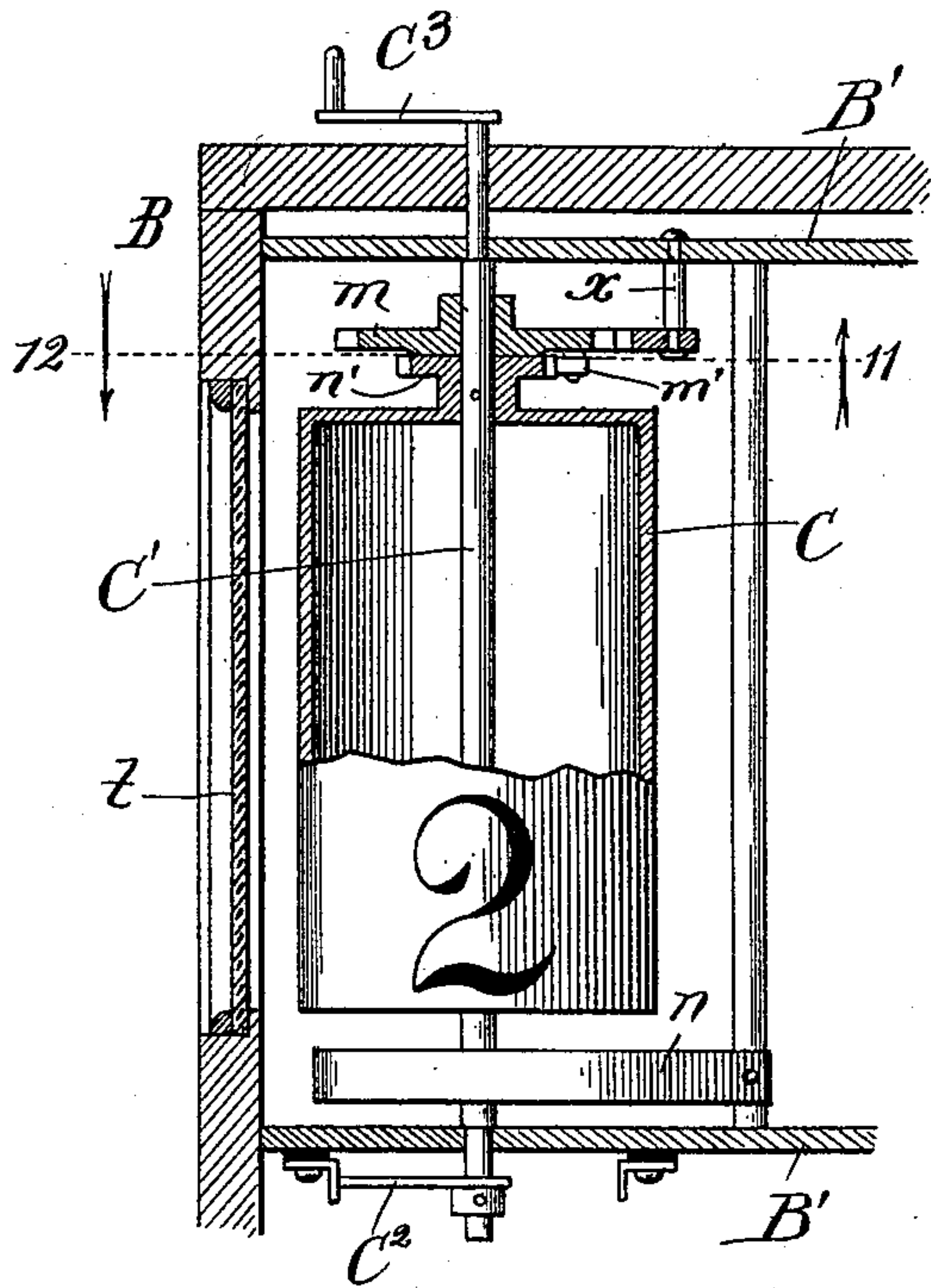


Fig. 4.

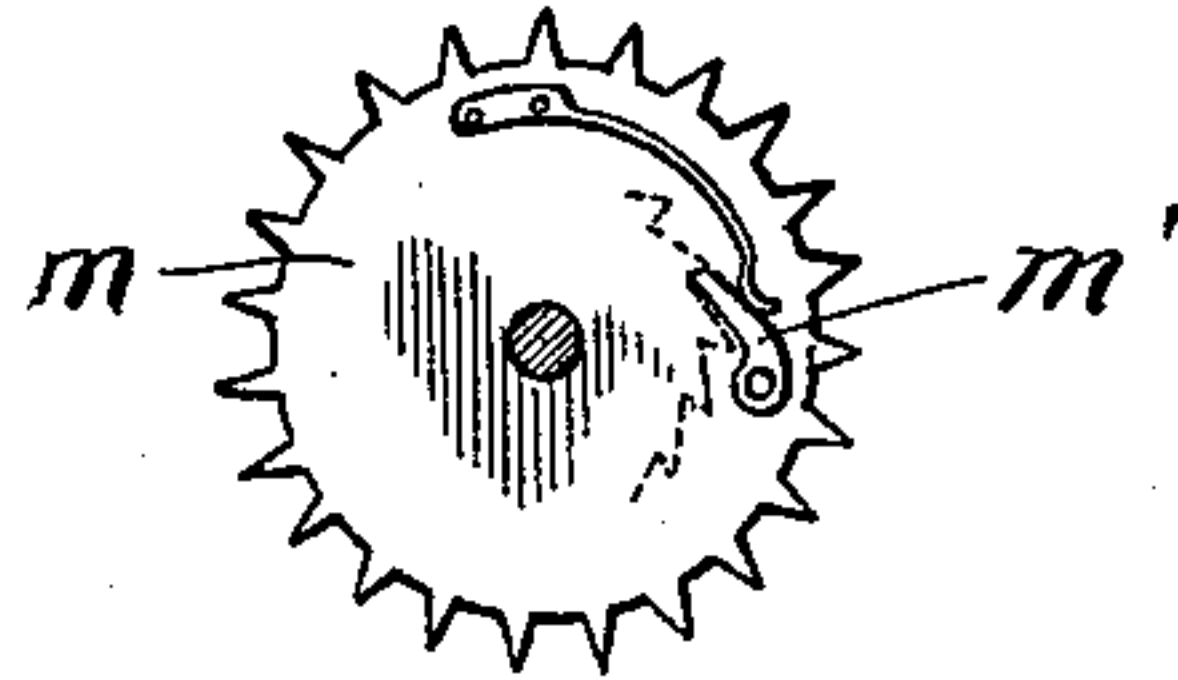


Fig. 5.

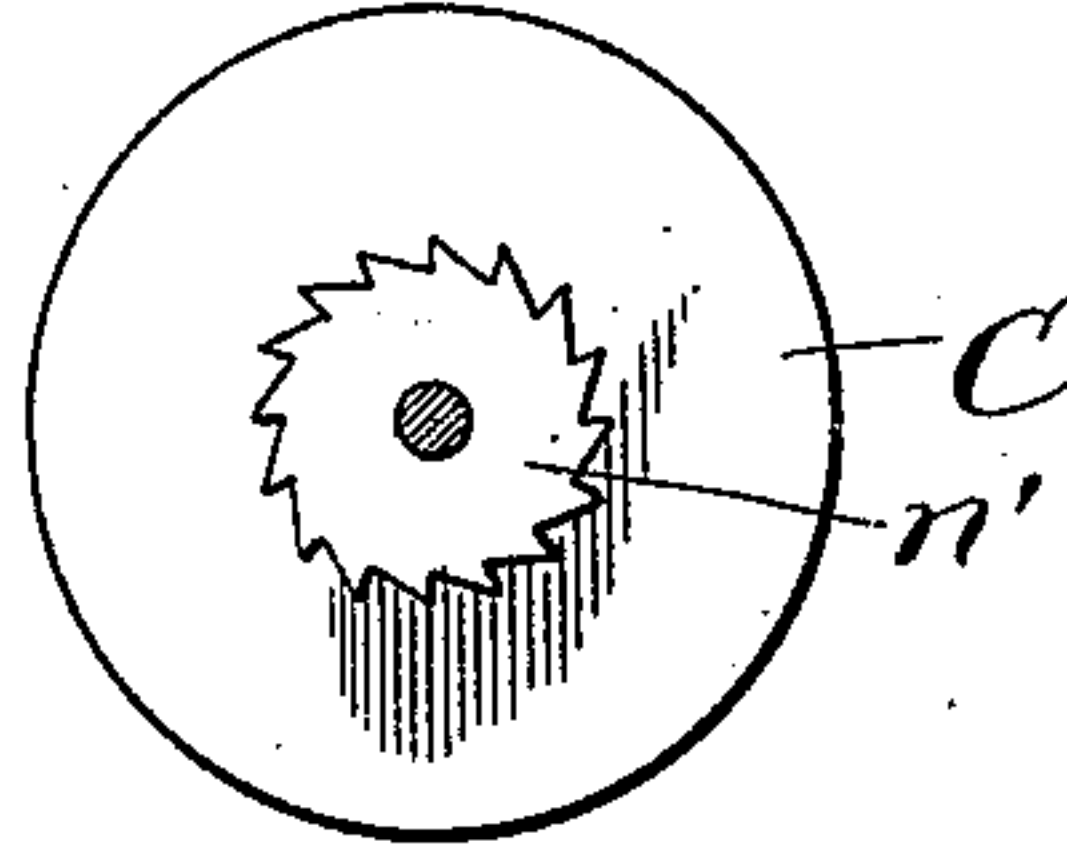


Fig. 7.

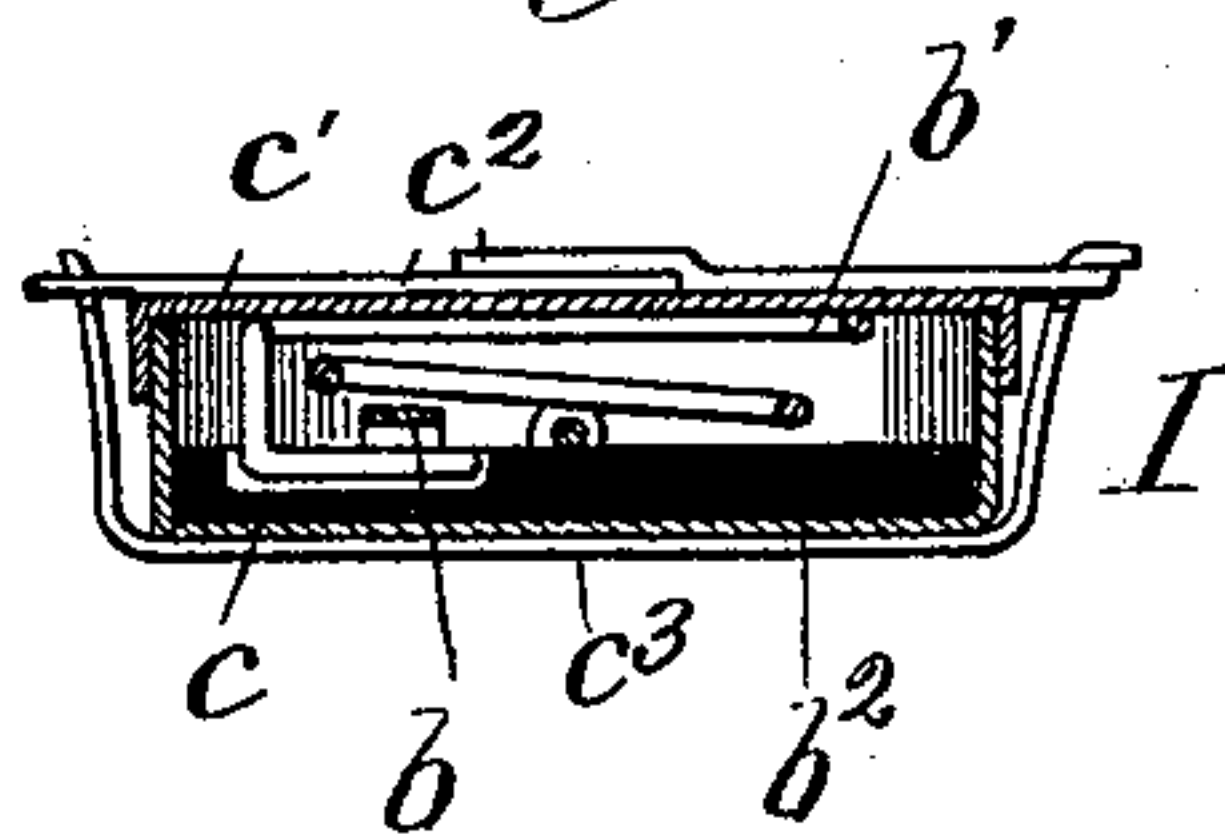
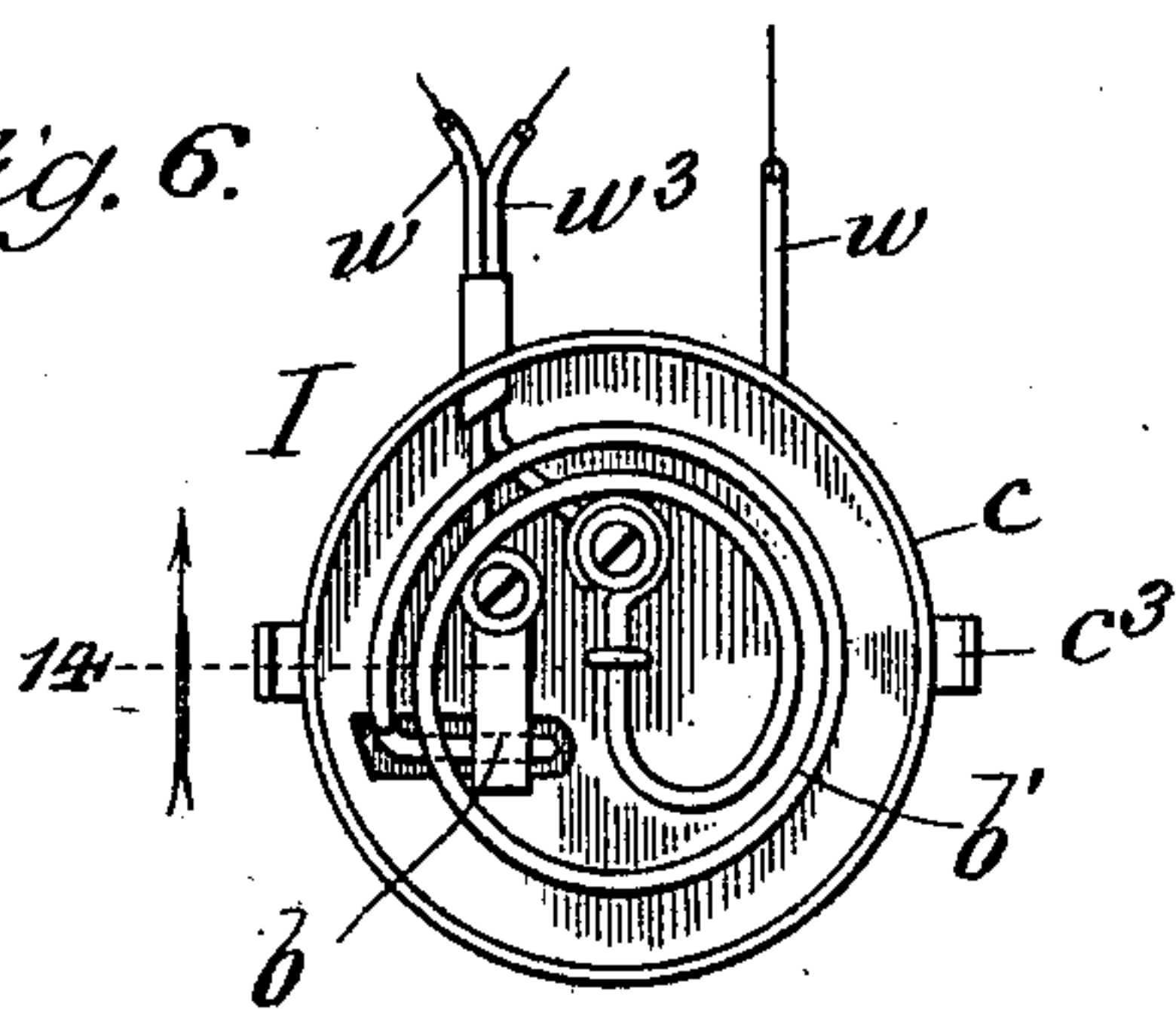


Fig. 6.



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ELECTRIC BURGLAR AND FIRE ALARM.

SPECIFICATION forming part of Letters Patent No. 583,644, dated June 1, 1897.

Application filed February 20, 1897. Serial No. 624,287. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. FRASER, Jr., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric Burglar and Fire Alarms, of which the following is a specification.

The primary object of my invention is to provide an electric burglar-alarm for the protection of residences and other places of habitation which shall involve in its normal condition when in use a closed circuit, to be broken by opening or tampering with a window or door, and thereby cause the alarm to be sounded; and my further object is to combine with the burglar-alarm, by including in its circuit, an automatic fire-alarm which shall be in condition for operation all the time, thus also when the burglar-alarm is rendered inoperative, as it customarily is during the daytime.

My invention consists in the general construction of my improvement; and it also consists in details of the mechanism and of the construction thereof and in combinations of parts, all as hereinafter more particularly described, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 shows the mechanism of my improved combined electric burglar and fire alarm arranged diagrammatically for the sake of elucidation. Fig. 2 is a broken perspective view of the signal device, showing the arrangement of its contacts; Fig. 3, a view, partly in section and partly in elevation, of the indicating-drum and mechanism connected therewith; Fig. 4, a section taken at the line 11 on Fig. 3 and viewed in the direction of the arrow; Fig. 5, a section taken at the line 12 on Fig. 3 and viewed in the direction of the arrow; Fig. 6, a view in front elevation of the automatic fire-alarm attachment with its cover and fusible cover-locking strap removed to display the internal mechanism, and Fig. 7 a section taken at the line 14 on Fig. 6 and viewed in the direction of the arrow.

A is an electric signal device or alarm-sounder, preferably in the form of an electric bell of the following-described construction:

A' is the bell, and r is its hammer on the end of the armature p of an electromagnet q . The

armature has extending at a right angle from it, near one end, at which it is controlled by a spring q' , an arm p' , which gives to the armature the form of a bell-crank lever and at which it is fulcrumed, as represented at v . Adjacent to the free end of the armature are the two flat spring-contacts o and o' , flanking the plane in which the hammer r vibrates, the contact o being bent at its outer end to afford a stop o^2 . As the armature vibrates to ring the bell, under the conditions hereinafter described, its end rubs against the surfaces of the contacts o and o' and scrapes them, thereby keeping them clean and bright and accordingly enhancing their conductivity. The elasticity of the contact o causes it to supplement the attracting force of the magnet, in the intervals wherein the armature-retracting spring q' is relaxed, by bearing, in the sense of pulling or pushing, against the upper end of the armature, and by eccentrically fulcruming the armature, permitted by its bell-crank form, the downward strain against its upper end of the spring-contact tends the more effectively to force it toward the poles of the electromagnet. This construction obviates the necessity of providing the usual adjusting-screws for the controlling-spring q' , which easily get out of order.

Following is the description of the mechanism contained within the case B of the device, the case being preferably formed of wood (though the material is not of the essence of the invention) and of rectangular form, with an opening t in one side through which to display indications and which should be covered with glass or other transparent material to protect the mechanism inside.

C' is a rotary shaft journaled in upright position in the top and bottom plates of a bearing-frame B', contained in the case B, the shaft carrying a drum C, beyond one end of the drum a coiled spring n , fastened at one end to the shaft and at its opposite end to the bottom of the frame, and beyond the other end of the drum a ratchet-wheel n' , (shown as fast on the drum,) adjacent to another ratchet-wheel m on the shaft and carrying a spring-controlled dog m' , engaging with the teeth of the ratchet-wheel n' . The drum C is surrounded by a series of numbers

(indicated on Fig. 3) representing the different rooms to be protected by the device, as hereinafter described, and which numbers may advantageously be made luminous, as by forming them with luminous paint.

On the under side of the bottom plate of the frame B' are fastened in a circular series concentric with the shaft C' and insulated from the plate the spring-contacts l , l' , l^2 , l^3 , and l^4 , one for each window and door to be protected and one for each fire-alarm attachment employed, so that the number of these contacts may be greater or less than the five illustrated, and the number of indicating-characters on the drum should correspond with the number of contacts employed. On the lower projecting end of the shaft C' it carries, to rotate with it, a switch-finger C², adapted to brush the series of contacts in its path when the shaft is permitted to rotate under the force of the recoil of its spring n , which is wound up through the medium of a handle C³ on the upper projecting end of the shaft. With the teeth of the ratchet-wheel m there engage the pallets k on a lever k' , fulcrumed at x and carrying a weight k^2 , the lever extending into the path of the free end of the spring-controlled armature D' of an electromagnet D, supported in the frame B', adjacent to and in parallel relation with the drum C. Above the armature and fulcrumed between its ends to extend parallel therewith is a lever D², bent contrarily, as shown, at its opposite ends and affording a brake or lock for the armature of the magnet D, as hereinafter described. This magnet is formed with two windings of insulated wire, one being of high resistance—say seventy-five ohms—and the other of low resistance—say two ohms.

At the side of the frame B' opposite that at which the drum and the electromagnet D are located are supported the electromagnets E and F, each formed with two spools, though only one spool of each is disclosed, owing to the nature of the view presented by Fig. 1. The poles of these electromagnets face each other, and the magnets have a common armature G on a vertically-disposed lever G', fulcrumed between its ends at x' and carrying on its lower end a shoe i , of insulating material, to control, as hereinafter described, the engagement of a spring-contact h with a contact h' and that of another spring-contact g with a contact g' .

Connected with the lever G' by a link f is a lever e , fulcrumed between its ends at x^2 to extend at one end beyond the box or case B through a slot in the top thereof and carrying at its opposite end an indicator-disk e' , bearing the notice "Off," to be displayed through an opening in the case (indicated at d in Fig. 1) when brought coincident therewith, as it may be by manipulating the push-button H to lock the burglar-alarm mechanism, as hereinafter described.

I is the fire-alarm attachment, comprising a metal box c , (shown of disk shape and pro-

vided with a cover c'), held in place by a strap c^2 , formed in two longitudinal sections fastened together at their adjacent mutually-overlapping ends by a readily-fusible solder, the strap extending across the top of the cover and being engaged at its opposite ends with the ends of a spring-stirrup c^3 , fastened to the base of the box to cause the ends to project along opposite sides thereof beyond its open edge, and the box c contains an insulated spring-contact b and a helical spring b' , fastened at one end to the insulated bottom b^2 inside the box, and extending at its opposite end underneath the contact b , from which it is normally held away by the confining pressure against the spring b' of the cover held in place by its fusible locking-strap.

The foregoing describes all the mechanism involved in my improved device, except the battery-circuits, through which it is operated and controlled, of which the following is a description with particular reference to Fig. 1.

From the positive pole of the battery M (a desirable species of which, owing to its uniform permanency and durability, is that known as the "Laland ampere-hour battery") a wire w proceeds to the contact l^4 ; thence to the box c of the fire-alarm attachment I, which may be located in any suitable place; thence from the box c , by way of the spring b' thereon, to the contact b^3 through, say, a door K, (merely indicated in Fig. 1 like the windows,) to the contact b^2 ; thence through a window L to the contact l' ; thence through another window L to the contact l , thence through another window L to the high-resistance winding of the magnet D, from which it proceeds through the bell-magnet q to the contacts o and o' and by way of the armature p to the contact h and contact h' to the negative side of the battery. In this connection should be explained the preferred manner of wiring the doors and windows to cause the alarm to be sounded not only when either is opened, but also by cutting through the panel of the door and by removing the glass from a window. The wire w where it is applied to a door and to a window should be very light and brittle. On a door K it may be fastened to extend across the panel, whereby any cutting thereof to effect an entrance through it will sever the wire and open the circuit to sound the alarm. On a window the same character of wire may be embedded in the putty by which the glass is secured in the sash, whereby removing the putty to release the glass will involve breaking the wire with the same result as that described of severing the wire on the door-panel. The wires w on the doors are connected with contacts on the hinged edges thereof, which contacts bear against contacts in the door-frame when the doors are shut to maintain the circuit over the wire w closed, and the wires on the windows lead to contacts on the edges of the sash, which contacts bear against spring-contacts in the window-frames when the windows are closed, thereby to maintain

there also the circuit over the wire w normally closed.

With the low-resistance winding of the magnet D there is connected the circuit-wire w' , one end of which leads to the switch-finger C^2 and the other end connecting with the wire w at x^4 .

The push-button circuit leads from the positive pole of the battery M, by the wire w^2 , through the electromagnet E, thence through the push-button H to the negative pole of the battery.

A branch of the circuit w is formed by the wire w^3 to include the fire-alarm attachment from the spring-contact b , from which it leads through the magnet F, thence to the contacts g and g' , and to the negative pole of the battery.

As the parts are shown by the diagrammatic representation in Fig. 1, the device is in operative condition ready to sound the alarm on breaking the closed circuit w , either by opening a window or door or by fusion of the strap c^2 of the fire-alarm attachment I to permit the spring b' to force off the cover c' , and by the release or recoil of that spring to permit it to engage with the spring-contact b .

It will be understood that owing to the high resistance in the circuit w of one winding of the magnet D the current on the circuit cannot traverse it to ring the alarm device A, which is operated by the current on the low-resistance winding of that magnet when the main circuit is broken, as happens when a window or door is opened or fire attacks the attachment I. Thus, for illustration, suppose the door K to be opened or the wire thereon to be severed: Thereby the magnet D will be deenergized, causing its controlling-spring to withdraw its armature D' from the magnet-poles and release its engagement with the weighted lever k' , which is thereupon oscillated back and forth by the turning force of the spring n , exerted against the shaft C' to rotate it, the pallets k acting as an escapement to regulate the rotation of the drum C. The shaft will continue to rotate until the finger C^2 reaches the contact l^3 , at which it will stop, since the breach in the circuit will be thereby closed from that contact over the finger C^2 , wire w' , through the magnet D, (reenergizing the latter to attract its armature and stop the lever k' ,) to the bell over the wire w , which connects the wire w' with the battery. Thus the bell is rung and will continue to ring until the circuit w is again closed or the mechanism is switched off. Precisely the same result will occur when any window is opened or the wire thereon severed by the breaking of the high-resistance section in the wire w and inclusion therein of the low-resistance section by engagement of the finger C^2 with the particular contact in its path which relates to the window.

When the fire-alarm attachment is disarranged from its normal condition by fusion of the strap c^2 , the recoil of the spring-wire

b' raises its free end into engagement with the contact b , thereby breaking the connection of the box c with the wire w by throwing off the box-cover (the medium through which the spring b' made contact with the metal box) and making connection of the spring b' , the fast end of which is permanently connected with the outgoing section of the wire w in the box with the wire w^3 , which leads from the fire-alarm-attachment box through the magnet F and through contacts g and g' to the negative side of the battery. Hence when this condition of the attachment is brought about by fire the magnet D, being deenergized, releases its armature and, in the manner already described, permits the shaft C' to rotate till the finger C^2 engages with the contact l^4 , whereby the low-resistance circuit will be closed, the current flowing from the battery over the wire w to the contact l^4 , thence by way of the finger C^2 to the wire w' , through the low-resistance winding of the magnet D to the wire w , and through the alarm A and contacts h , h' back to the battery.

When it is desired to render the burglar-alarm inoperative to permit doors and windows to be opened during the day without sending it off, as it is early in the morning before the inmates of the house arise, so as not to disturb them, a servant, or other person whose duty it is, will press the push-button H, thereby closing the circuit over the wire w^2 and energizing the magnet E to cause it to attract the armature G with the following effect: The shoe i is moved from the contact h (thereby permitting it to separate from the contact h' and open the circuit on the wire w) to the contact g and presses the latter against the contact g' , the upper end of the lever G' moves down the inclined end of the brake-lever D^2 and forces its opposite end against the armature D' to lock it against withdrawal from its magnet and prevent the shaft C' from rotating, and accordingly closure of the low-resistance circuit from sounding the alarm. By the movement of the lever G' , which locks the armature D' , it pulls over the lever e to bring the disk e' coincident with the opening d to show that the alarm device is off. Of course, as will be understood, instead of using a push-button for the described purpose any suitable automatic mechanism operative at predetermined times by clockwork may be employed.

With the device in the locked condition described the alarm will not be prevented from sounding in case of fire, for then by the severance of the cover c' from the box c the circuit on the wire w^3 , including the contacts g g' , will be closed, since the cover of the box c will be off and the spring-wire b' will engage with the contact b and thus connect in the box the wire w^3 with the wire w , whereby the current will flow from the battery over the wire w to the wire w^3 and through the magnet F and contacts g g' to the negative end of the battery, with the effect of energiz-

ing the magnet F and causing it to attract the armature G to withdraw the shoe *i* from the contacts *g g'* and permit separation thereof and opening of the circuit *w*³ by the time the shoe has engaged the contact *h* with the contact *h'*, and the consequent movement of the upper end of the lever G' unlocks the armature D'. By bringing the contacts *h* and *h'* thus together the circuit on the wire *w* is left open only at the attachment I, causing the magnet D to be deenergized and to release its armature, with the effect of permitting the shaft C' to rotate till the finger C² engages with the contact *l*⁴, when the current will flow from the wire *w*, by way of the finger and wire *w'*, through the low-resistance winding of the magnet D and sound the alarm device A, as hereinbefore described.

The indicating-characters on the drum C are so arranged and spaced apart, with regard to the distance of movement of the finger C² between the contacts it engages, that wherever the drum stops in its rotation it will display, through the opening *t* in the case B, the character indicating the room or part of the house where the window or door has been opened or the fire is.

In Fig. 1 switch devices *a* are indicated adjacent to the doors and windows. These may be used for short-circuiting the current around any window or door it may be desired to open without sounding the alarm. These switches may be located wherever desired—all, for instance, on a common switchboard in any conveniently-accessible place.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an electric burglar-alarm, the combination of an alarm-sounder in a normally closed circuit including the windows or doors to be protected and containing a high-resistance section, a normally open branch circuit including said sounder and containing a low-resistance section, and means for closing said branch circuit by opening said high-resistance circuit, substantially as and for the purpose set forth.

2. In an electric burglar-alarm, the combination of an alarm-sounder in a normally closed circuit, including the windows or doors to be protected, an electromagnet having a high-resistance section contained in said circuit and a low-resistance section, a normally open branch circuit including said sounder and low-resistance section, and means, controlled by the armature of said magnet, for closing said branch circuit on the opening of said high-resistance circuit, substantially as and for the purpose set forth.

3. In an electric combined burglar and fire alarm, the combination of an alarm-sounder in a normally closed circuit including the windows or doors to be protected and containing a high-resistance section, a normally open branch circuit including said sounder and containing a low-resistance section, a heat-operated fire-alarm attachment included in

both said circuits, and means for closing said branch circuit by opening said high-resistance circuit, substantially as and for the purpose set forth.

4. In an electric combined burglar and fire alarm, the combination of an alarm-sounder in a normally closed circuit including the windows or doors to be protected, an electromagnet having a high-resistance section included in said circuit and a low-resistance section, a normally open branch circuit including said sounder and low-resistance section, a heat-operated fire-alarm attachment included in both said circuits, and means, controlled by the armature of said magnet, for closing said branch circuit on the opening of said high-resistance circuit, substantially as and for the purpose set forth.

5. In an electric burglar-alarm, the combination of an alarm-sounder in a normally closed circuit including the windows or doors to be protected, an electromagnet provided with a spring-controlled armature and having a high-resistance section contained in said circuit and a low-resistance section, a normally open branch circuit including said sounder and low-resistance section, a series of contacts in said normally closed circuit, a rotary shaft carrying a switch-finger in said branch circuit, and means for driving said shaft controlled from said armature and released by opening said high-resistance circuit to rotate the shaft and the switch-finger with relation to said contacts, and thereby close said branch circuit, substantially as and for the purpose set forth.

6. In an electric burglar-alarm, the combination of an alarm-sounder in a normally closed circuit including the windows or doors to be protected, an electromagnet provided with a spring-controlled armature and having a high-resistance section contained in said circuit and a low-resistance section, a normally open branch circuit including said sounder and low-resistance section, a series of contacts in said normally closed circuit, a rotary spring-driven shaft carrying a switch-finger in said branch circuit and an indicator device, and an escapement connection between said armature and shaft normally locked by said armature and released by opening said high-resistance circuit to rotate the shaft and the switch-finger with relation to said contacts and thereby close said branch circuit, substantially as and for the purpose set forth.

7. In an electric burglar-alarm, the combination of an alarm-sounder in a normally closed circuit including the windows or doors to be protected, an electromagnet provided with a spring-controlled armature and having a high-resistance section contained in said circuit and a low-resistance section, a normally open branch circuit including said sounder and low-resistance section, a series of contacts in said normally closed circuit, a rotary spring-driven shaft carrying a switch-finger in said branch circuit and an indicator-drum,

provided with a ratchet at one end, a ratchet on said shaft having a spring-dog connection with said drum-ratchet and tappets engaging said shaft-ratchet on a weighted lever normally locked by said armature and released by opening said high-resistance circuit to permit the spring to rotate said shaft and said finger with relation to said contacts and thereby close said branch circuit, substantially as and for the purpose set forth.

8. In an electric burglar-alarm, the combination of an alarm-sounder in a normally closed circuit including the windows or doors to be protected, an electromagnet D provided with a spring-controlled armature and having a high-resistance section contained in said circuit and a low-resistance section, a normally open branch circuit including said sounder and low-resistance section, a series of contacts in said normally closed circuit, a rotary shaft carrying a switch-finger in said branch circuit, means for driving said shaft controlled from said armature and released by opening said high-resistance circuit to rotate the shaft and the switch-finger with relation to said contacts and thereby close said branch circuit, a brake-lever D^2 for said armature, an electromagnet E in a separate circuit, having an armature G on a lever G' engaging at one end said brake-lever and throwing of which by the attraction of the armature G to its magnet turns said brake-lever against the armature D' to lock it, and a contact device, such as the push-button H for closing the circuit containing said magnet E to energize it, substantially as and for the purpose set forth.

9. In an electric combined burglar and fire alarm, the combination of an alarm-sounder in a normally closed circuit w including the windows or doors to be protected, an electromagnet D provided with a spring-controlled armature and having a high-resistance section contained in said circuit and a low-resistance section, a normally open branch circuit w' including said sounder and low-resistance section, a series of contacts in said normally closed circuit, a rotary shaft carrying a switch-finger in said branch circuit,

means for driving said shaft controlled from said armature and released by opening said high-resistance circuit to rotate the shaft and the switch-finger with relation to said contacts and thereby close said branch circuit, a brake-lever D^2 for said armature, an electromagnet E in a separate circuit w^2 , having an armature G on a lever G' engaging at one end said brake-lever and throwing of which by the attraction of the armature G to its magnet turns said brake-lever against the armature D' to lock it, a contact device in the circuit w^2 , a shoe i on the lower end of said lever G', an electromagnet F having the armature G in common with said magnet E and included in a branch circuit w^3 containing the contacts g and g' , contacts h and h' in said circuit w , and a fire-alarm attachment I included in said circuits w and w^3 , the whole being constructed and arranged to operate substantially as described.

10. The alarm-sounder of an electric burglar-alarm and the like, comprising, in combination with a bell A', a magnet q , a vibratory bell-crank-shaped armature p therefor fulcrumed at v and controlled by a spring q' and carrying the hammer, and spring-contacts o and o' with the surfaces of which said armature, in its vibrations, makes a rubbing contact, said contact o having formed upon its free end a stop o^2 , substantially as and for the purpose set forth.

11. The automatic fire-alarm attachment of an electric fire-alarm comprising, in combination, a metal box c having a removable cover c' held in place by a fusible strap c^2 fastened to extend across said cover, an insulated contact b in said box and a coiled-wire-spring contact b' insulated and confined in said box by said cover out of engagement with said contact b to make contact therewith by the recoil of the spring b' when the cover is removed, substantially as and for the purpose set forth.

JOHN R. FRASER, JR.

In presence of—

J. H. LEE,

R. T. SPENCER.