No. 621,340. Patented Mar. 21, 1899.

W. H. HOLLAR.

BURGLAR PROOF SAFE.

(Application filed Aug. 11, 1898.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.

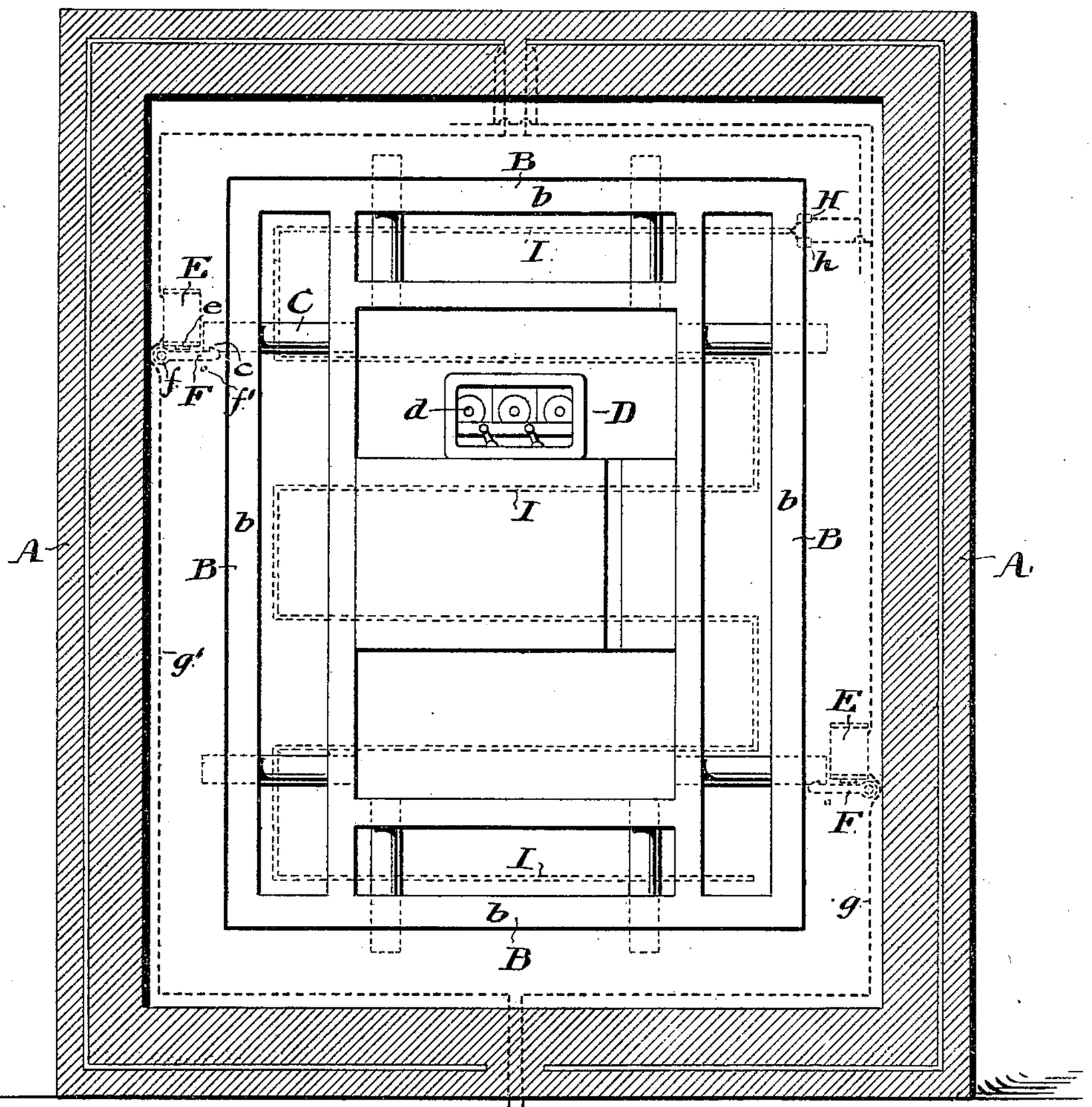


FIG. 2.

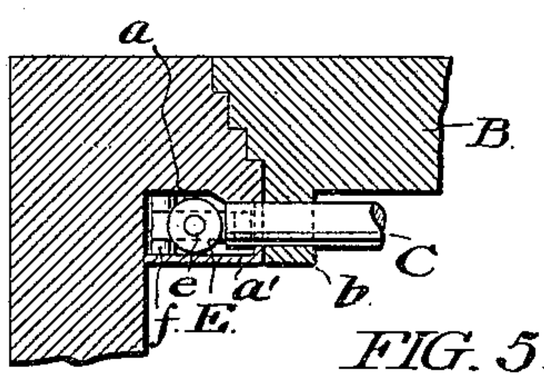


FIG. 3.

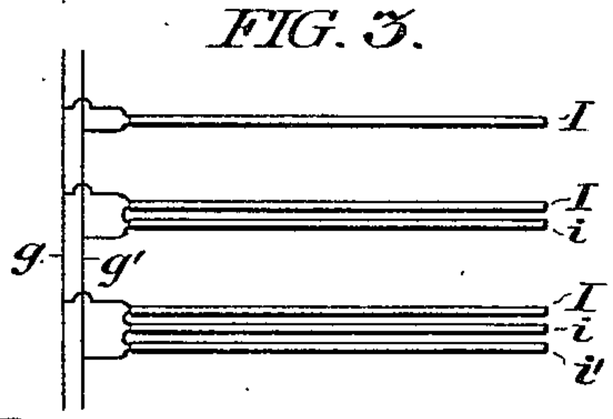
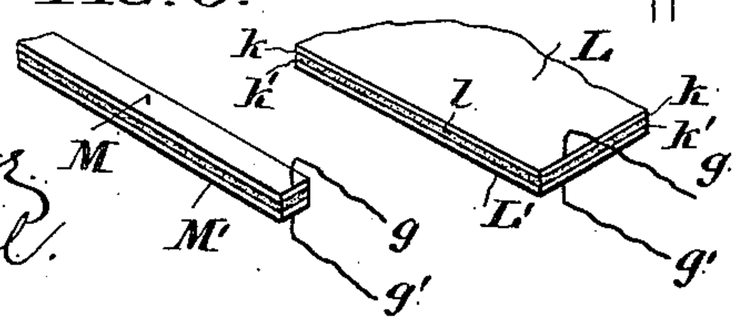


FIG. 5.

FIG. 4.



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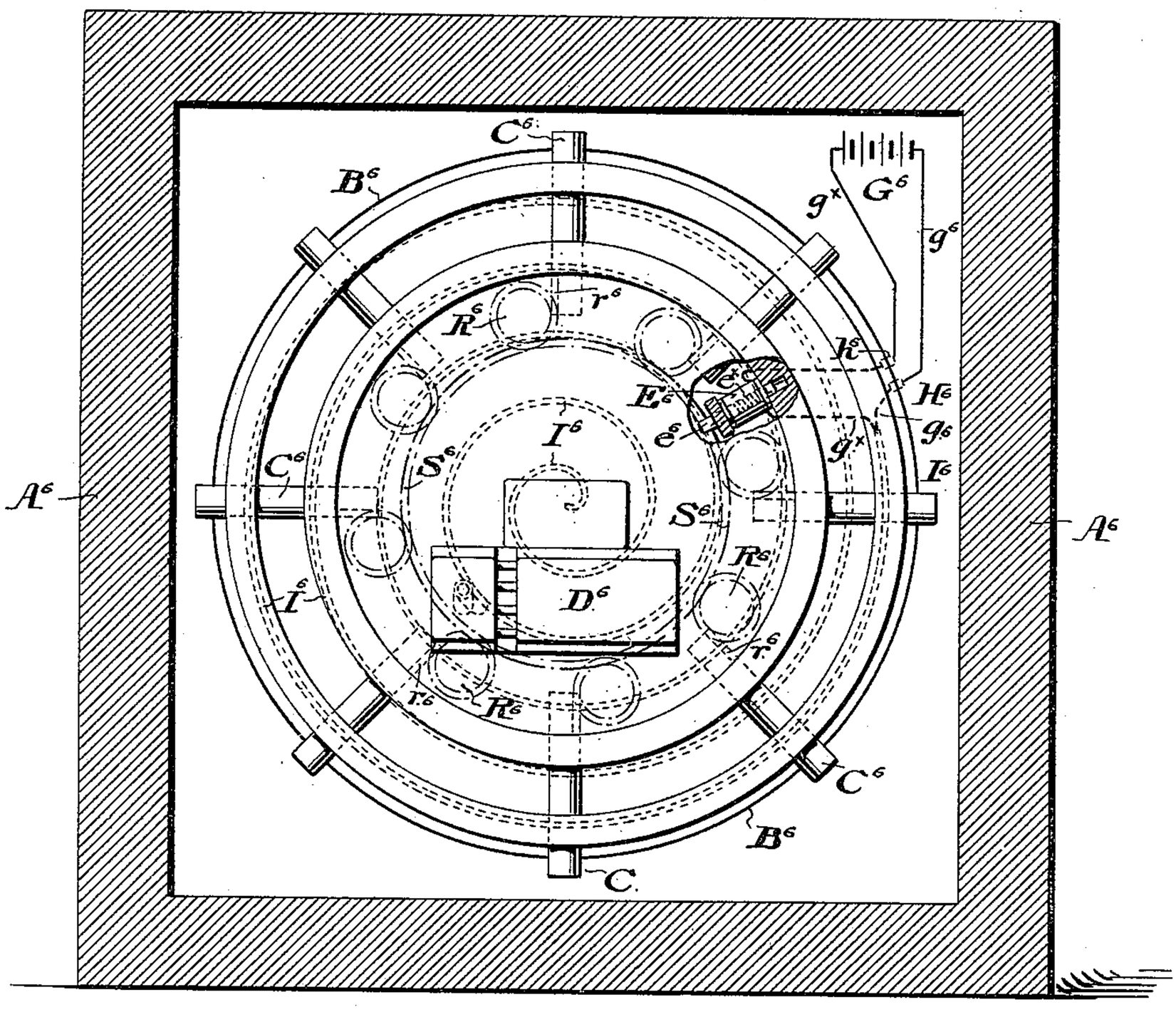
4 Sheets—Sheet 2.

FIG. 6.



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(No Model.) 4 Sheets—Sheet 3.

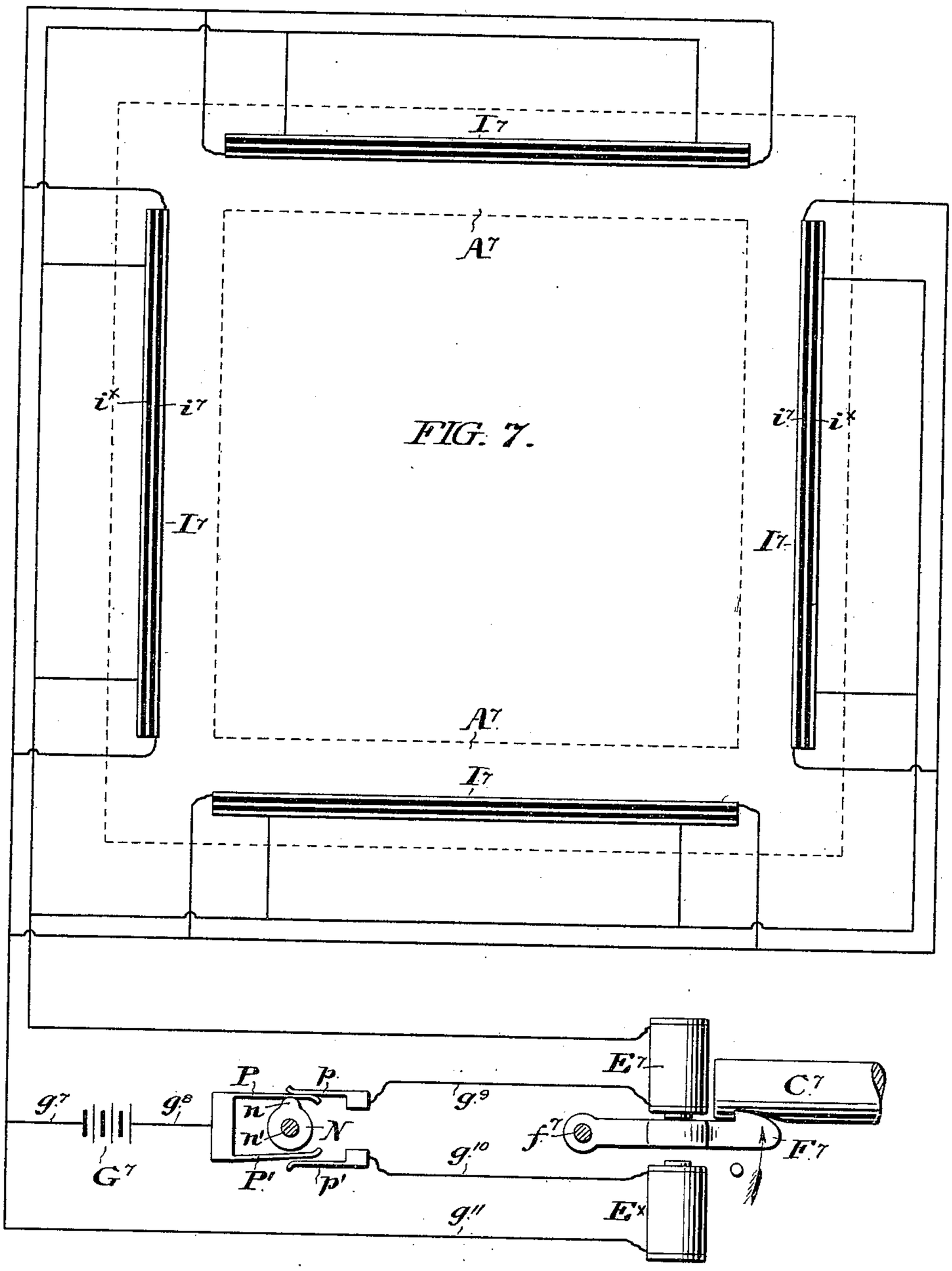

FIG. 7.

FIG. 8.

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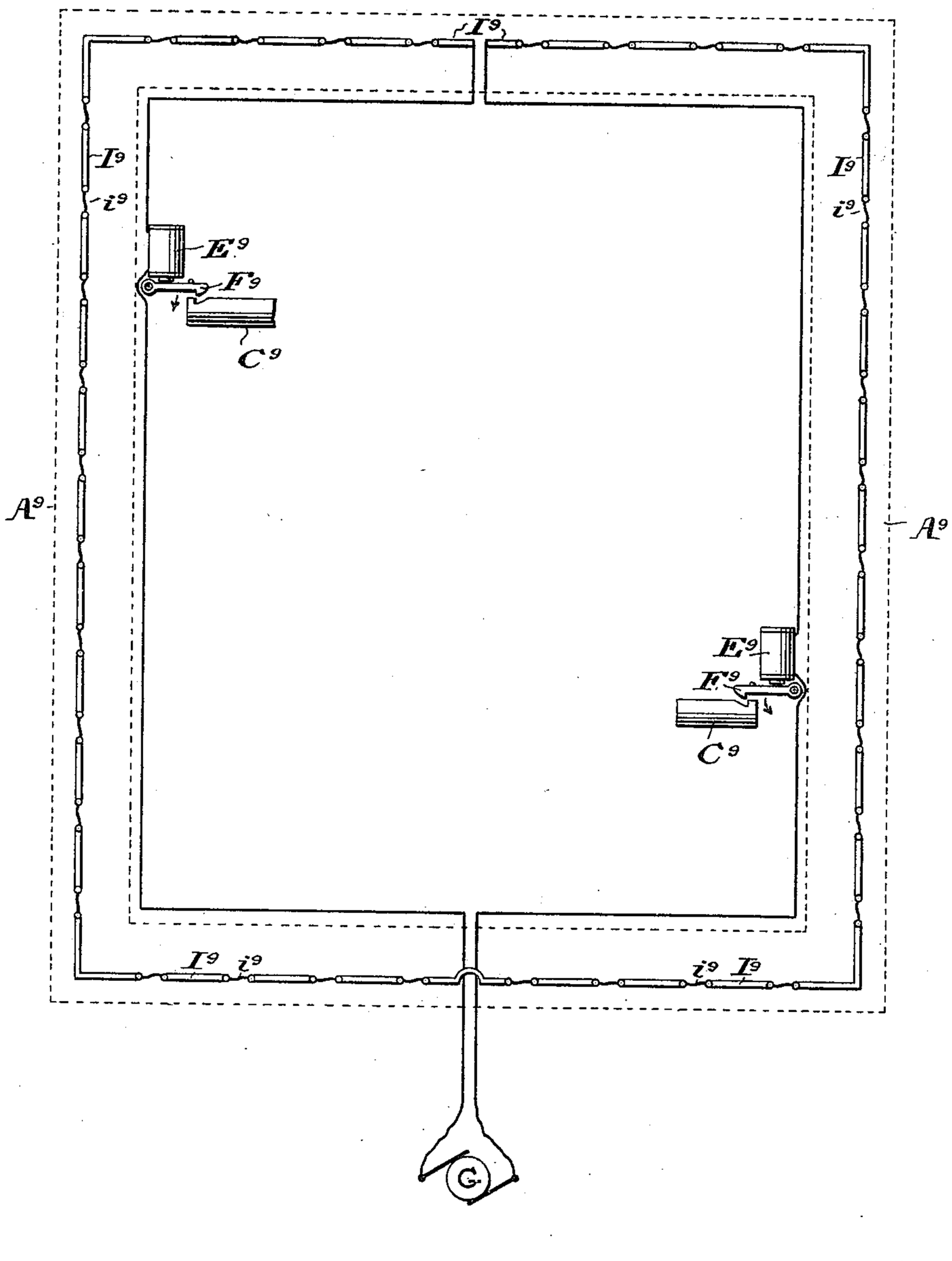
(No Model.) 4 Sheets—Sheet 4.

FIG. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM H. HOLLAR, OF PHILADELPHIA, PENNSYLVANIA.

BURGLAR-PROOF SAFE.

SPECIFICATION forming part of Letters Patent No. 621,340, dated March 21, 1899.

Application filed August 11, 1898. Serial No. 688,351. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. HOLLAR, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Burglar-Proof Safes, whereof the following is a specification, reference being had to the accompanying drawings.

In said drawings, Figure 1 represents a vertical section through an ordinary rectangular safe embodying my improvements, the inside face of the door being shown in elevation. Fig. 2 is a partial transverse section showing details of the mechanism. Fig. 3 is a diagrammatic view showing certain alternative arrangements of electric circuits, which form part of the invention. Figs. 4 and 5 indicate alternative forms of portions of the electric-circuit devices. Fig. 6 is a vertical section through a safe embodying my invention, the door of the safe, however, being circular and the boltwork thereof controlled by mechanism such as that set forth in my pending application for patent, Serial No. 683,165, filed June 11, 1898. Fig. 7 is a diagrammatic view illustrating a modified form of the devices embodied in my invention. Fig. 8 is a view in perspective, showing a modification of the details of bolt-engaging devices. Fig. 9 is a diagrammatic view illustrating a modified form of the devices embodied in my invention.

The general object of my invention is to provide against successful attack upon the boltwork of a safe-door by penetration of the wall of the safe or of the door itself. Broadly speaking, the invention comprises a detent adapted to engage with the boltwork, said detent being actuated by the disturbance of the normal condition of an electric circuit whose conducting members are disposed throughout the region likely to be attacked, and means being provided whereby upon penetration of the wall or door of the safe the circuit shall be established or broken to cause or permit operative action of the detents.

In the drawings I have given various typical embodiments of the invention and will now proceed to describe them in detail.

The particular embodiments of my invention about to be described are arranged with special view to preventing penetration of the safe by means involving heat.

Referring to Fig. 1, A represents the wall of the safe, and B the door thereof, said door being provided on its inside face with a bolt-frame *b*, carrying the bolts C. In this instance said bolts are shown as provided with time-lock mechanism, (indicated at D,) which may be of any ordinary construction and which need not be further described, except that for the purposes of one type of my invention it is to be noted that I shall refer to an arbor *d* as indicating one of the moving members thereof.

Any desired number of the bolts C may be provided with detents; but in the present instance I have shown only two such devices, and as they are similar in form only one need be described. The parts are shown in dotted lines in Fig. 1. The protruding end of the bolt C is provided on its under side with a notch *c*, with which a swinging detent F, pivoted at *f* to the wall of the safe, is adapted to engage when raised into a horizontal position and when thus engaged to positively hold the bolt against retraction.

In the type shown the detent F is normally inoperative, as it rests by gravity upon a stop *f'* and has its engaging portion clear of the bolt. An electromagnet E, having a core *e*, is arranged above the detent F in such relation thereto that when energized the magnet shall be capable of raising the detent into a position adapted for operative engagement with the bolt. This position is shown in the drawings. In order to protect the magnet and detent as far as possible from access in the event of penetration of the door, I prefer to mount them in a recess *a*, near the door-jamb, and to cover them by means of a plate or strip *a'*.

The source of electricity is represented at G and may (as in the instance shown in Fig. 1) be external to the safe, the conducting-wires *g g'* in this instance entering through some protected portion of the wall and leading to contacts H *h* at the margin of the door-frame, adapted to make connections with continuations of said wires when the door is closed. The magnet or magnets (the number of which will of course vary in accordance with the desired construction) are included in said circuit, which in the form shown in said figure is normally open, a portion thereof comprising insulated conductors in close proximity

with each other, but insulated to such extent as will avoid the danger of accidental establishment of the circuit. Said conductors are provided with interposed or adjacent conducting material fusible at a comparatively low temperature and adapted when fused to penetrate the insulation and establish the circuit between the conductors at the region of the fusion. For purposes of description I shall refer to the group comprising the conductors, insulating material, and fusible conducting material as the "compound conductor," said conductor being indicated at I in Fig. 1, and as such thermostatic devices are well known I do not deem it necessary to further describe them in detail. The compound conductor may be disposed throughout a comparatively wide region of the safe-door and adjacent walls, or, indeed, to any extent which is deemed necessary under special circumstances in order to efficiently protect such parts as are deemed liable to be attacked. Instead of embodying the compound conductor in cable form it may be arranged as shown in Fig. 4, where the wires g g' are represented as leading to sheets of conducting material L L', respectively, having an interposed sheet of highly fusible metal I interposed between them and penetrable insulating layers k k', arranged between the respective conducting-sheets L L' and the fusible layer I. In Fig. 5 a somewhat similar arrangement is shown, the conducting material being arranged, however, in strips M M' instead of sheets.

In Fig. 3 I have shown a diagrammatic view to indicate means whereby a factor of safety may be introduced.

Instead of using merely a pair of conductors with fusible circuit-making material interposed, as shown at I in Fig. 3, I may employ two pairs, as at I i, or even three pairs, as at I i i', the members being so arranged as to require for the establishment of a circuit not merely the fusion of the interposed circuit-making material in one of the pairs, but in two or more. Thus locking of the bolts through accidental failure of the insulation or through closing of the circuit from causes other than that which is desired to guard against will be to a great extent obviated.

Referring now to the type of apparatus shown in Fig. 6, A^6 indicates the wall of the safe, and B^6 the circular door thereof, having radially-protruding bolts C^6. Each of these bolts is actuated by means of a pinion R^6, which engages with a rack at r^6 near the inner end of the bolt, said pinion being actuated in turn by means of a large gear S^6, which is controlled by the lock mechanism proper situated at D^6. Detailed description of these parts is not deemed necessary, as the same forms part of my application, Serial No. 683,165, above referred to, and it is sufficient for the purposes of the present case to note that the system of bolts as a whole is actuated by rotation of the gear S^6 in one direction or the other. The detent in the present instance is the core of a solenoid, the solenoid being represented at E^6 and the core thereof at e^6, said core being normally held clear of the gear S^6 by means of a spring $e^\times$; but when the solenoid is energized the core e^6 is shifted into a position adapted to engage with and lock the gear S^6. In this instance the source of electricity G^6 is indicated as arranged within the safe itself. The conductors g^6 $g^\times$ lead therefrom to contacts H^6 h^6 at the margin of the door-opening and are continued thence in the door itself, one of them leading through the solenoid to a point where the two are brought into close proximity and continued in the form of a compound conductor having a fusible member, as above described. This compound conductor I^6 is disposed in spiral form in the present instance, so as to effectually protect a very large portion of the area of the door. The operation of this form of device is substantially similar to that above described—viz., upon abnormal rise of temperature at any given point in proximity to the fusible member of the compound conductor the circuit will be established and the solenoid energized, so as to thrust the core thereof into operative engagement with the gear-wheel S^6, thus locking the entire boltwork.

In Fig. 7 a diagrammatic illustration is shown, in which A^7 represents the safe, whose walls may be all provided with a compound conductor I^7. In this instance it is shown as consisting of sheets or strips of material and as being threefold, so as to require the fusion of at least two intermediate layers i^7 $i^\times$ in order to complete the circuit, thus guarding against accidental establishment thereof. In the lower portion of the figure the diagrammatic view is continued upon an enlarged scale, so as to show the details of the bolt-engaging devices. The bolt is indicated at C^7 and the detent at F^7, this type being similar to that shown in Fig. 1. Two magnets, however, are employed, so as to shift the detent in either direction. These magnets are indicated, respectively, at E^7 and $E^\times$, the circuit of the magnet E^7 only being the one which comprises the compound conductor. The source of electricity is indicated at G^7. One of the terminals is connected by a conductor g^8 to a pair of contact devices—in this instance a block having two spring-arms P P', tending normally to spring together and thus remain out of contact with corresponding arms p p', which overlap them. A wire g^9 from the arm p leads to the magnet E^7, thus forming a part of the circuit comprising the compound conductor I^7, while a wire g^{10}, in connection with the short arm p', leads to the magnet $E^\times$, the circuit being completed to the source of electricity through the shunt-wire g^{11}. A contact shifting device, such as a rotatable cam N, mounted upon a shaft n' and having a projecting lug n, is arranged in such relation to the contact-arms P P' as to be capable of holding one or the other thereof in contact with its corresponding arm p p', according to the

position of the cam. The shaft n' of this cam N is operatively controlled by a moving member of the time-lock mechanism, such as the arbor d, (see Fig. 1,) the purpose of this device being to permit the opening of the safe after the expiration of a predetermined period, even though in the meanwhile the protecting devices may have been thrown into operation by attack upon the safe or otherwise. Thus throughout the whole period during which protection is desired the position of the cam N will be such as to maintain contact between the arms P and p; but when the period provided by the time-lock mechanism for opening the safe-door has arrived the shaft n' will be actuated by the time-lock mechanism so as to turn the cam N throughout a half-rotation and the communication between the arms P and p will be broken, while communication will be established between the arms P' and p', thus completing the circuit through the magnet $E^{\times}$ and energizing the latter to draw down the detent F^7 and free the bolt C^7.

In Fig. 8 I have shown a modified form of the bolt-engaging devices, consisting in a solenoid E^8, having a core e^8 adapted when protruded by energizing the solenoid to engage with a notch c^8 in the bolt C^8. This form of detent may be found convenient in some instances as a substitute for the swinging member shown in Fig. 1.

Fig. 9 is a diagrammatic illustration of the form of my invention in which the circuit is arranged similarly to that of Fig. 1, including magnets E^9 E^9, but differing from the arrangement in said figure in that the thermostatic conductor I^9 comprises fusible elements i^9, through which the circuit is normally established. The thermostatic conductor I^9 is extended through the safe structure in substantially the same relation therewith as the conductor I. (Shown in Fig. 1.) It is obvious that fusion of any one of the elements i^9 would suffice to break the circuit and release the detents F^9, and thus engage the bolts C^9.

In the types of apparatus which have been described the disposition of the parts has included a thermostatic element by means of which the penetration of the safe by means involving heat causes a disturbance of the normal state of the electric circuit, thereby setting in motion the detaining mechanism; but it is obvious that the disturbance of the normal condition of the circuit may be effected by the mere penetration of a tool. Thus, for example, in the arrangement shown in Fig. 4, where there are sheets of conducting material separated by insulating-layers, the mere penetration of a metallic tool, even though the intervening insulating-layer be not fused, will establish the electric circuit and actuate the detaining mechanism. These sheets may be disposed throughout the walls and door of the safe, and when so disposed any penetration of the walls will disturb the circuit, as has been explained.

It will be noticed that in the types of apparatus shown in Figs. 1 and 7 the detent directly engages with the bolt itself, while in the type shown in Fig. 6 the detent engages a moving member connected with the general system of boltwork—in this instance the actuating element thereof. Hence I obviously do not limit the scope of my invention to the particular mechanism whereby the detention of the bolt or bolts is effected, but mean to comprehend under the language of my claims not only a detent which directly engages the bolt itself, but also any device which indirectly controls the movement of the bolt by engagement with any member comprised in the general system of boltwork. Furthermore, in using the term "compound conductor" as a convenient one to express the general character of the thermostatic conducting device I do not mean to limit myself to the particular kinds of conductor shown and described, it being merely essential to my purpose that there should be in the electric circuit (by means of which the action of the detent is caused or permitted) a device adapted to disturb the normal condition of the circuit upon any local rise of temperature to an abnormal degree, such thermostatic device being of a character adapted to extension throughout the region which it is desired to protect.

I of course intend to comprehend under the term "safe" vaults and other locked inclosures of the same general character.

Having thus described my invention, I claim—

1. In a safe the combination with the boltwork, of a detent adapted to operatively engage therewith; an electrically-actuated controlling device for said detent; a source of electricity in circuit with said controlling device; and elements in pairs each forming an opposite part of said circuit, disposed in proximity to each other in the walls and door of said safe whereby upon penetration of the safe, the electric circuit is disturbed and the controlling device actuated to cause or permit engagement of the detent.

2. In a safe the combination with the boltwork, of a detent adapted to operatively engage therewith; an electrically-actuated controlling device for said detent; a source of electricity in circuit with said controlling device; and a thermostatic element comprised in such circuit, whereby upon local rise of temperature to an abnormal degree, said controlling device is actuated to cause or permit engagement of the detent, substantially as described.

3. In a safe the combination with the boltwork, of a detent adapted to operatively engage therewith; an electrically-actuated controlling device for said detent; a source of electricity; and a compound conductor comprised in the electric circuit of said controlling device, said conductor being provided with means, substantially as described, where-

by upon local rise of temperature to an abnormal degree the circuit is caused to actuate said controlling device, substantially as described.

4. In a safe provided with time-lock mechanism, the combination with the boltwork, of a detent adapted to operatively engage therewith; an electrically-actuated controlling device for said detent; a source of electricity; a compound conductor comprised in the electric circuit of said controlling device, said conductor being provided with means, substantially as described, whereby upon local rise of temperature to an abnormal degree, said controlling device is actuated to cause or permit engagement of the detent; a contact-shifting device in said circuit; and means substantially as set forth for operatively connecting said shifting device with a movable member of the time-lock mechanism, substantially as described.

5. In a safe provided with time-lock mechanism, the combination with the boltwork, of a detent adapted to operatively engage therewith; electrically-actuated controlling devices for said detent, adapted respectively to shift the same into and out of engagement with the boltwork; a source of electricity; a compound conductor comprised in the electric circuit of said controlling devices, said conductor being provided with means, substantially as described, whereby upon local rise of temperature to an abnormal degree the circuit is caused to actuate said controlling device; contact devices situated respectively in the circuits of said controlling devices for the detent; a contact-shifting device adapted to open one and close the other of said circuits; and means substantially as set forth for operatively connecting said contact-shifting device with a movable member of the time-lock mechanism, to open one of said circuits and close the other thereof, substantially as described.

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Witnesses:
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JAMES H. BELL.