(No Model.) 3 Sheets—Sheet 1.

C. J. KINTNER.

ELECTRO MAGNETIC TIME LOCK.

No. 384,856. Patented June 19, 1888.

Figure 1.

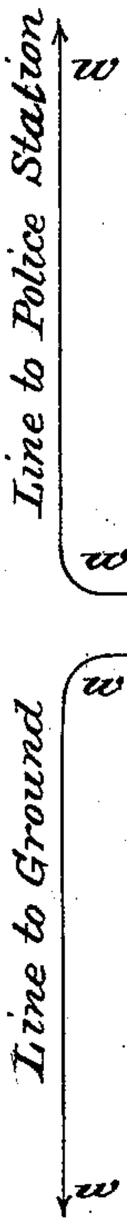

Figure 2.

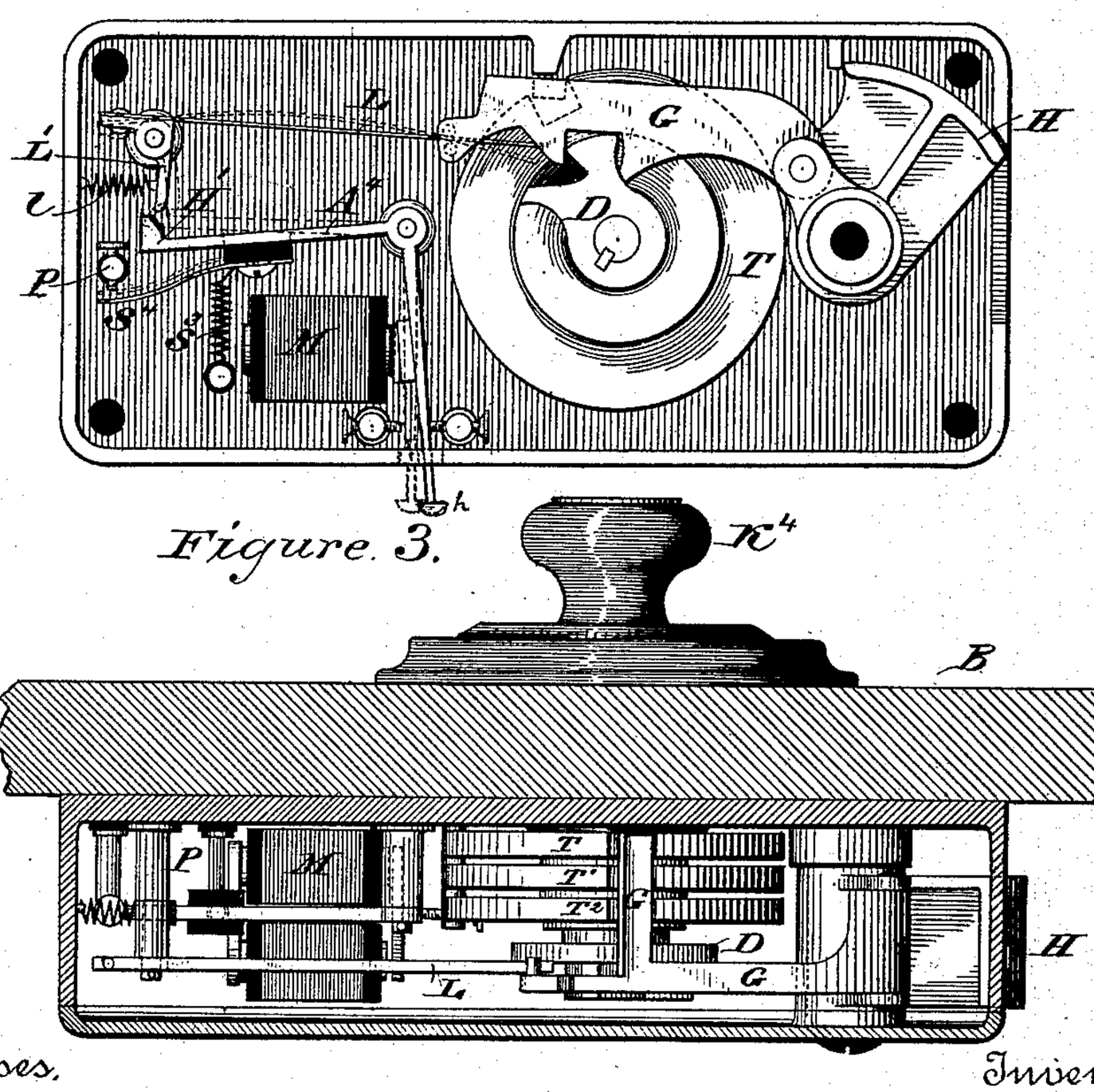

Figure 3.

Witnesses.

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Inventor.

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(No Model.) 3 Sheets—Sheet 2.

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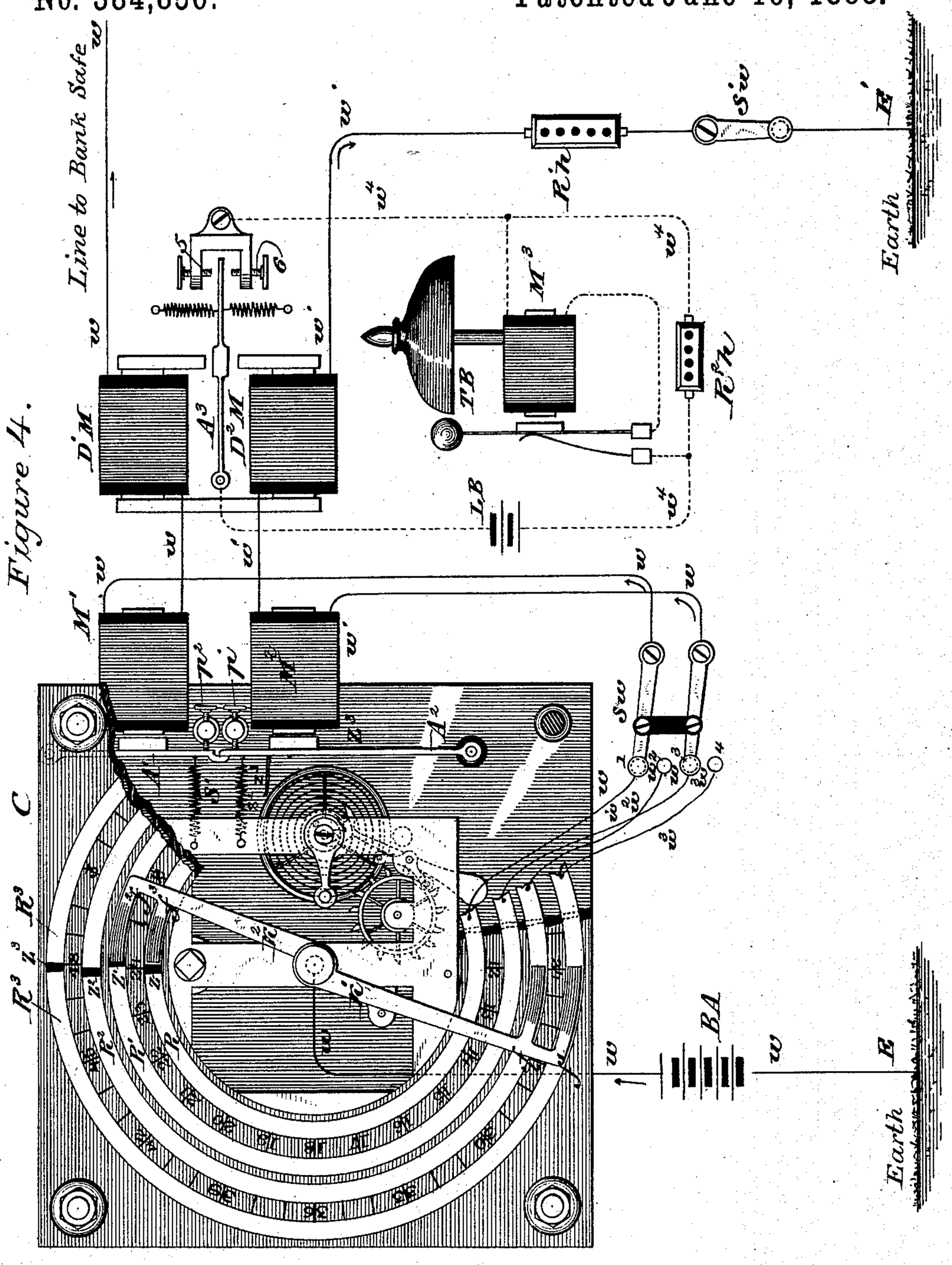
Figure 4.



Witnesses.

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(No Model.) 3 Sheets—Sheet 3.

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ELECTRO MAGNETIC TIME LOCK.

No. 384,856. Patented June 19, 1888.

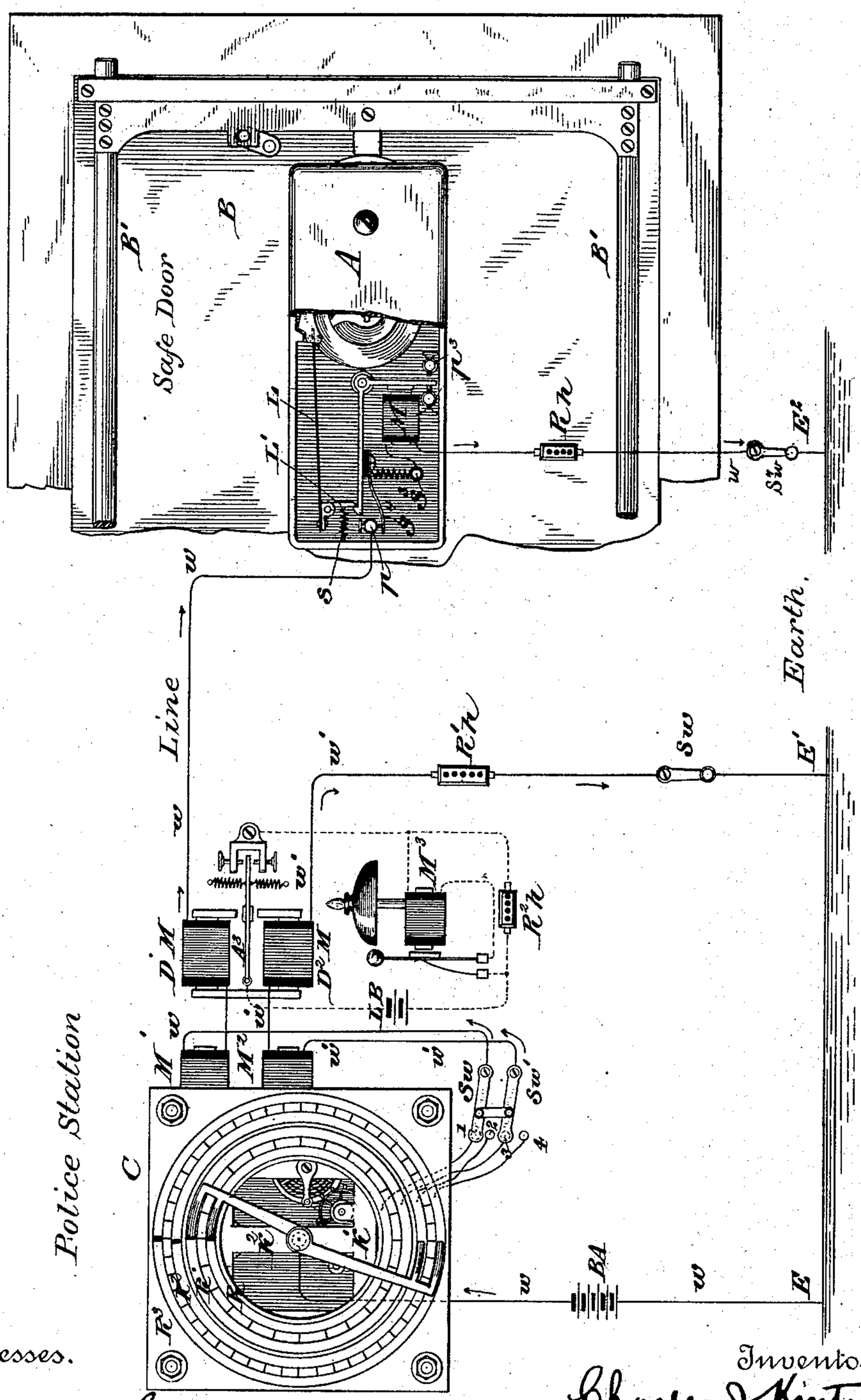

Figure 5.

Witnesses.

Wm A. Skinkle.

Arthur Johnson.

Inventor,

Charles J. Kintner.

UNITED STATES PATENT OFFICE.

CHARLES J. KINTNER, OF NEW YORK, N. Y.

ELECTRO-MAGNETIC TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 384,856, dated June 19, 1888.

Application filed December 5, 1887. Serial No. 256,983. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. KINTNER, of New York, N. Y., have invented a new and useful Improvement in Electro-Magnetic Time-Locks, of which the following is a specification.

My invention relates to improvements in time-locks; and to this end it consists in a time mechanism located at a police-station in connection with an electrical circuit joining said police-station, and a safe or vault at another station with electrical connections both at the police-station and the safe to be protected, these connections being such that any disturbance of the circuit will immediately automatically cause an alarm to be set up at the police-station.

It consists, further, in certain details of construction hereinafter enumerated, and particularly pointed out in the claims which follow this specification.

A full understanding of the invention will be had by reading the following specification and accompanying drawings, in which—

Figure 1 is a vertical elevation of a combination-lock and my attachments, showing the circuit made through a magnet in a safe. Fig. 2 is a similar elevation, showing the circuit broken at the safe with the locking-dog drawn. Fig. 3 is a horizontal cross-section on lines 3 3, Fig. 1, showing the gate in its lower position and controlling-magnet, together with the tumblers or disks of the lock and the locking apparatus. Fig. 4 is a diagrammatic view showing the circuits, the time mechanism, and electrical connections at the police or other guarding station. Fig. 5 is a similar view showing all the circuit-connections at both stations with the safe-door locked and the gate held out of acting position.

Prior to my invention it was the custom to locate the protecting time mechanism within the safe, and so set as to withdraw or control the operation of the dog at a predetermined hour, in accordance with well-known methods of operation, which it is not necessary to describe here. With such apparatus, however, it is impossible to enter the safe at any time other than the stated time, when it is designed that the time mechanism shall liberate the gate and place the bolts in condition to be drawn. Such apparatus is liable to and often does get out of repair, and it becomes necessary to send to a distant city—oftentimes to the manufacturer—for an expert to open the safe. This is often a matter of great inconvenience, inasmuch as valuable papers are sometimes wanted out of banking hours. With my apparatus these objectionable features are all overcome. A burglar-alarm check is set upon the safe and the whole control of such apparatus is under the immediate surveillance of the police at the police-station where the clock is located.

Referring to the drawings, C is a time mechanism of the usual construction, having on its hour-hand shafts two metallic arms, K^2 K′, adapted to revolve through the complete circumference of the circle, the first in twenty-four and the second in forty-eight hours. These metallic arms are connected through the hour-shaft with a battery, BA, by a wire, *w w*, earthed at E in the police-station. These arms K′ K^2 have each a pair of metallic fingers, $f f' f^2 f^3$, which are adapted to bear respectively on the rings R^3 R^2 R′ R, each of which rings is of metal and continuous, except at the insulated points Z Z′ Z^2 Z^3, as shown. The rings R R′ are connected by wires *w w′* to the points 1 3, on which rests a four-point switch, S *w*, connected respectively to the wires *w w′*, the former, *w*, running to the magnet M′, located in the clock-frame, and thence to one of the differential magnets D′ M, also located in or near the clock-frame, and finally to the distant station, to and through the walls of the safe or between the jambs of the door, to a metallic contact-point, *p*, located on the inner face of the door. Bearing against this contact *p* is a leaf-spring, S^4, connected by a spiral retractile spring, s^3, to and through the magnet M, and thence to a resistance, R *h*, also inside of the safe, finally passing outside of the safe to the earth E^2. The other branch passes from the ring R′ by the wire *w′* to the lower half of the switch S *w*, through the lower magnet, M^2, located also in the clock-frame, and thence to the lower half of the differential magnet D^2 M, ultimately passing to the earth through a rheostat, R′*h*, and the switch S *w* to earth at E′, all inside of the police-station. The wires w^2 w^3 are connected to the outer

rings, R^2 and R^3, and then by the arms $f f'$, through K′, wire w, and battery BA, to earth. When the four-point switch S w is placed upon the points 2 4, and the arm K^2 is attached to the hour-shaft of the clock and revolves once in twenty-four hours, while arm K′ is attached to a sleeve about said shaft, which is adapted to revolve once in forty-eight hours. A' A^2 are the armature-levers of the magnets M' M^2, respectively, and rest, when drawn up against the force of their retractile springs s' s^2, against the front stops, p' p^2. The lever A^2 has on its rear side a leaf-spring, Z^3, adapted to bear upon the balance-wheel of the clock when the magnets M' M^2 are both demagnetized. This spring rides back on the face of the balance-wheel as the armature falls on its back-stop, and will tend to give the balance-wheel an impetus, and thus set the clock going when said armature is drawn up. Any device commonly used for starting clock mechanism may be used, and this feature constitutes no part of my invention.

A^3 is an armature-lever held under the delicate adjustment of two equal and opposite spiral springs at a position midway between the poles of the magnets D′ M D^2 M, the function of the armature-lever being to close when drawn against either of the contact-points 5 or 6, by reason of the influence of either of the magnets D′ M D^2 M, a local battery-circuit, w^4, through the battery LB and magnets M^3, and thus actuate a trembler-bell, T B, which automatically opens and closes a shunt about the resistance or rheostat R^2h.

Referring, now, to the apparatus located at the safe shown in Figs. 1, 2, 3, and 5, K^4 is the combination spindle-knob, (see Fig. 3,) and T T′ T^2 are the combination-disks, G being the gate, H the bolt-locking dog, and D the lug on the inner end of the combination-spindle, for causing the gate to draw the bolt-locking lug, when it is allowed to drop into place, in the notches of the disks, in a manner well understood.

L is a spring-lever pivoted at one end and having a sliding bearing at the other between two rollers or lugs in the end of the gate G, as shown in Figs. 1, 2, 3. This lever has a bell-crank lever, L′, with a retractile spring, l, and both are held in the upward position (shown in Fig. 1) by the hook H′ on the armature-lever A^4, when the circuit is closed through the point p, springs s^4 s^3, and magnet M. It is the function of this apparatus (shown in Figs. 1, 2, and 3, in detail, and on the right in Fig. 5) to hold the gate G out of the path of the lug D until the circuit is broken through the electro-magnet M.

When the lock is open on its front, as shown in Fig. 1, the circuit may be closed at the point P by lifting the lever L and gate G, and then placing the hook H of armature-lever A^4 behind the arm L′. By this act spring S^4 will be brought into contact with point P, and the circuit closed through magnet M and battery at distant station. The door of the safe may then be closed and the bolts turned into locking position. It will be understood, of course, that the ingoing and outgoing wires pass in between the door and the jamb at the hinges. When the lock is in closed form, as shown in Fig. 2, the top being temporarily removed, I extend the lower end of the armature-lever A^4 through the lock-case, and provide a handle, h, for manipulating it, the hooked end having such a cam shape as will cause it to lift the gate through the agency of lever L′ and spring L. To operate this form the operator simply carries the handle h to the left, and thereby lifts the gate and at the same time closes the circuit through the magnet M, as before, at point P.

I will now describe the operation of my improvements. Suppose the safe-door B to be closed and the bolts held in locking position, with the gate G held out of the path of the lug D by reason of the influence of the spring L, levers L′, and A^4 acted upon by magnet M. Suppose, also, that the clock has been set in motion, as it will be on releasing the balance wheel on closing the circuit at the point p within the safe, thereby energizing magnet M′ at the police-station. Under this condition of affairs the circuit from battery BA finds a path in the direction of the arrows, by way of wire w, to arm K^2 on the hour-hand of the clock, and thence, by the spring-arm f^3, to the ring R, wire w, contact-point 1, switch S w, wire w, magnet M′, wire w, outside of the station, to the bank or safe to be protected, where said wire enters between the door and the jamb and passes to the point p, circuit being had through the springs s^4 and s^3 to the magnet M and rheostat Rh, located also within the safe, passing finally outside the safe to the earth at E^2. This causes the magnet M′ to draw up its own armature-lever A′, and also the armature-lever A^2, thus allowing the clock to start. It also energizes the magnet D′ M and causes its armature A^3 to close the local circuit W^4, through the trembler-bell TB and local battery LB, causing the said bell to be actuated by opening and closing a circuit, as shown, through the magnet M^3 and about the rheostat R^2h, thus warning the police that the banker has closed his safe. After the clock has run a few minutes, or a sufficient length of time to carry the contact-arm f^2 off of the insulated strip Z′, the battery B A finds two paths for its current, the first one passing, as before, to the safe at the distant station, and the second, by way of the arm f^2, ring r', and wire w', four-point switch S w, wire w', magnet M^2, wire w', differential magnet D^2 M, wire w', through a resistance or rheostat, $R'h$, and switch S′w to the earth at E′, the total resistance of this circuit from the contact-spring f^2, through magnets M^2 D^2 M and rheostat $R'h$, being exactly equal to that of the other branch circuit. Under this state of affairs D′ M and D^2 M being wound to have equal and opposing influences on the armature A^3, cause it to take the central position, and thus al-

low the bell TB to cease ringing. The armature A^3, being very sensitive to delicate changes in either of the magnets D′ M or D^2 M, will, on causing any undue change of resistance in the circuit running to the bank, be withdrawn to one side or the other, and thus close the local bell or alarm circuit and indicate that something is wrong, or that the circuit is being tampered with. As long as the circuit running to the bank is left intact the gate will be held out of the path of the tumblers and prevent any tampering with the lock. The clock will continue to run for twenty-four hours, at the end of which time the main or line circuit will be automatically broken at the point Z on the ring R′, thereby allowing the armature-lever A′ to fall back; but the clock will not be stopped until the other branch circuit, *w′*, is broken by the arm f^2, riding on to the insulated point Z′ of the ring R′. Before this occurs, however, the first contact-arm, f^3, will again have made contact with the ring R, having passed off its insulated point Z, thus leaving the main circuit in condition to be closed, when the circuit is closed at the point *p*, as has been heretofore disclosed. It will be seen that when the main circuit is open at the safe and the contact-arm f^2 on the insulated strip Z′ of ring R′, and f^3 is in the position shown in Fig. 4, there is no battery on either branch of the differential circuit. By this arrangement I avoid the waste of battery during the banking hours and leave it wholly under the control of the person at the bank. Of course it will be understood that the circuit-breaking points Z Z′ Z^2 Z^3 may be located at different positions in the respective circles R R′ R^2 R^3, so as to break the circuit at any desired time, and said rings may be adjustable, if desired, so as to be set either in advance or the rear of the points indicated. The rings R^2 R^3, together with the arm K′ and its contact arms *f f′*, constitute what I call the "Sunday" or "holiday arm", and are designed to leave the safe locked a greater length of time than usually prevails during the business portion of the week. When these arms and rings are used, of course the switch S *w* is changed from points 1 3 to points 2 4, and the operation is identical with that described as heretofore for the twenty-four-hour system. The rheostat R *h* should be of such resistance as is known only to the builder of the lock, and should be so placed within the safe as to be inaccessible to persons ordinarily using the safe.

A switch, S″*w*, may be located between the safe and the earth E^2, accessible to the cashier at some concealed point within the bank, by which he may open the circuit out of business hours; but such an action would of course alarm the police, and it would be necessary before doing this to advise them, in order that they might go with the cashier to the bank and ascertain that all was right. The four-point switch S*w* must be set by hand from the points 1 3 to the points 2 4 when it is desired to connect the forty-eight-hour circuit in lieu of the twenty-four-hour circuit.

If the differential magnet D′ M and D^2 M is sufficiently delicate, it will of course be sensitive to any inordinate changes in the line *w w*, so that any tampering therewith would necessarily close the local circuit and ring the bell T B. With this apparatus I locate the time mechanism for the safe at a distant point and provide simple mechanism which cannot readily get out of order, and at the same time leave the safe accessible at any and all hours, provided the police are warned. The clock mechanism and all its immediate connections located at the police-station should be under lock and key, accessible only to the bank officers.

I have shown the clock mechanism as adapted to run for twenty-four and forty-eight hours, respectively, but of course it may be arranged for any number of hours, such matters being dependent upon the length of time it is desired to have the safe closed. For banking purposes it would be preferable that the dials should indicate seventeen and forty-one hours, respectively, so that if the safe is closed at four p. m. on week-days it will be in condition to open at nine a. m. the next morning, or at the same time on Monday if closed through the thirty-five-hour rings on Saturday. And it should be understood that the alarm-bell should ring at the predetermined hour of opening the safe, say nine o'clock, by reason of the automatical action of the apparatus described, and it should also ring at the time of closing the safe, say four o'clock, thus giving warning twice a day of the condition of the lock, and the police should be instructed that unless this warning comes the bank should be visited at once to ascertain the cause of the trouble. With such a system and a course of instructions rigorously pursued it would be impossible for the safe to be tampered with out of office hours.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination of a safe-lock and electrical connections with a time mechanism located outside of the safe for controlling the operation of such lock, substantially as described.

2. The combination of a safe-lock with means for holding the gate out of operative relation with the tumblers, with electrical connections and time mechanism for controlling such means, the time mechanism being located wholly without the safe, substantially as described.

3. The combination of a time mechanism located at an outlying station, with an electrical circuit running from said station into a safe or vault at some distant point through an electro-magnet, also located in the safe, for controlling the operation of the lock, substantially as described.

4. The combination of a time mechanism

located outside of a safe and having electrical connections running to the interior of said safe, with means for preventing the withdrawal of the bolts until a predetermined time, substantially as described.

5. In a system for the protection of safes and vaults, the combination of a balanced electrical circuit including a time mechanism and an alarm at one point, with bolt-controlling mechanism located inside of a safe or vault at another point, substantially as described.

6. In a system for the protection of safes or vaults, the combination of a time mechanism to automatically break a protecting-circuit leading to a distant station at a predetermined time, with electrically-controlled means located within a safe or vault at such distant station for controlling the withdrawal of the bolts, substantially as described.

CHARLES J. KINTNER.

Witnesses:
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JNO. K. PLITT.