C. S. SHIVLER.

Electro-Magnetic Burglar-Alarm for Safes.

No. 197,416. Patented Nov. 20, 1877.

Fig. 1.

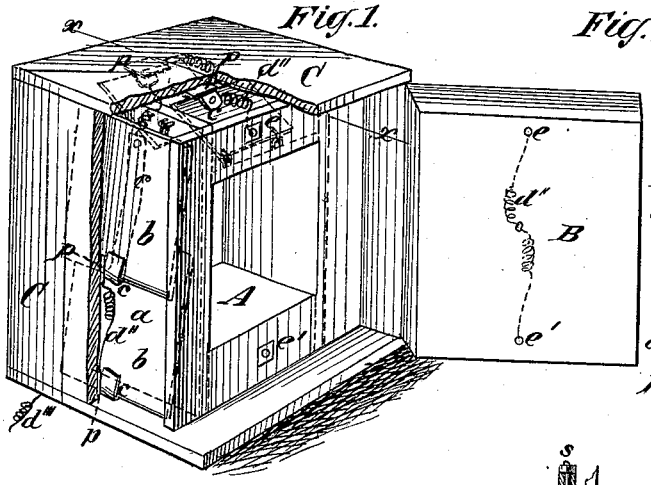


Fig. 2.

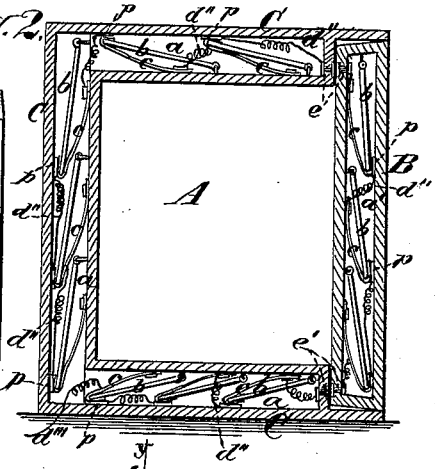


Fig. 3.

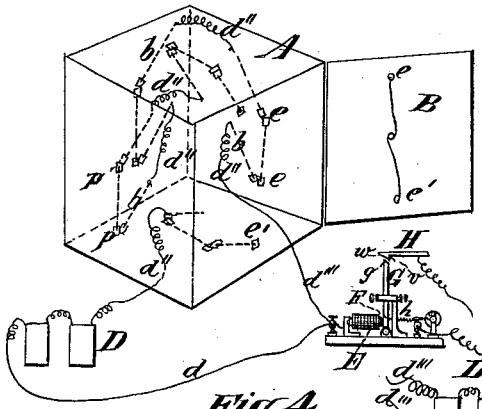


Fig. 6.

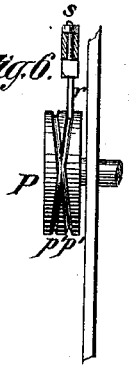


Fig. 7.

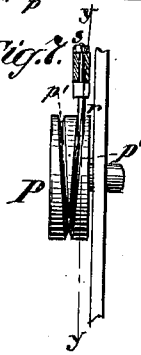


Fig. 8.

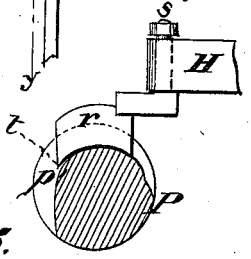


Fig. 4.

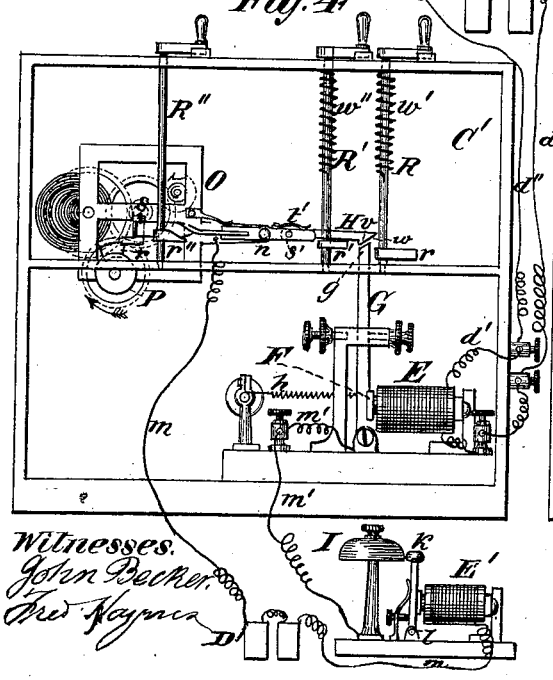
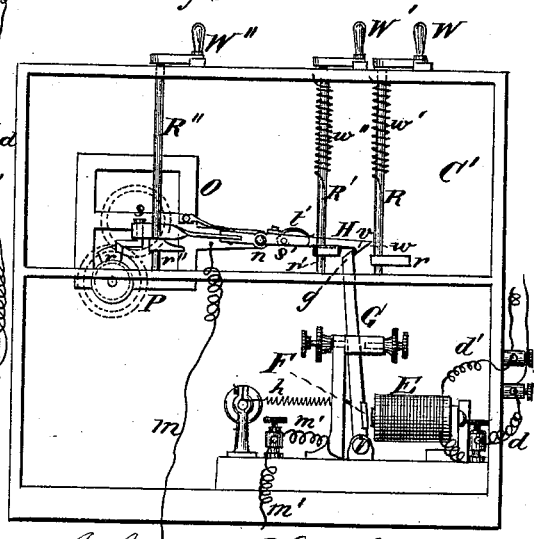


Fig. 5.



Witnesses.
John Becker.
Fred Haynes

Charles S. Shivler
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

CHARLES S. SHIVLER, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE W. TOMPKINS, OF SAME PLACE.

IMPROVEMENT IN ELECTRO-MAGNETIC BURGLAR-ALARMS FOR SAFES.

Specification forming part of Letters Patent No. **197,416**, dated November 20, 1877; application filed September 14, 1877.

To all whom it may concern:

Be it known that I, CHARLES S. SHIVLER, of the city and State of New York, have invented certain Improvements in Electro-Magnetic Safe-Protectors; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

The invention is applicable not only to safes, so called, but to vaults, strong rooms, &c., in which valuable goods, papers, or moneys are placed for safe-keeping. The invention will, however, be sufficiently illustrated by a description of it as applied to an ordinary safe.

Figure 1 in the drawing is a perspective view of a safe to which the invention is applied. Fig. 2 is a vertical section of the same made on the line *x x* in Fig. 1. Fig. 3 is a diagram, which will be used in explanation of the operation of the apparatus. Fig. 4 is a side view of an alarm connected with and forming part of the apparatus, with the parts in such position that the alarm is silent. Fig. 5 is a side view of the same, with the parts in position to render the said alarm operative. Figs. 6, 7, and 8 are details illustrating special features of the apparatus.

A, Figs. 1, 2, and 3, represents the safe, and B the door of the same. C, Figs. 1 and 2, represents a case for the safe, which may be conveniently made of wood, but which may, if preferred, be made of other material. Said case is, moreover, made large enough to leave a space, *a*, between it and the safe on all the sides which it incloses.

The door B is hollow, and it may be common to both the said safe and the said case, or the safe may have an additional special door provided, if desired. The space within the hollow door is shown at *a'* in Fig. 2.

Within the spaces *a* and *a'* are pivoted a series of overlapping, inclined, insulated, or insulating plates, *b*, which are, preferably, wholly made of insulating material, such as wood, hard rubber, &c., the use of insulating material for said plates obviating the necessity for special insulators to render the said plates themselves insulators otherwise required. Said plates are pivoted at their inner borders, and by means of insulated springs *c* are normally maintained in their inclined position across the space *a* or *a'* in such manner that the outer end of each spring rests against an insulated metallic plate, *p*, attached to the case.

The overlapping of the plates *b* prevents the introduction of any drill or other instrument of attack through the case C without contact with some one of said plates and pressing such plate away from the case. Said plates, therefore, constitute a series of yielding overlapping insulators.

Each of the springs *c* may be a part of a main circuit from a battery, D, Figs. 3 and 4, the course of which is from said battery through a wire, *d*, to and through the coil of an electro-magnet, E, situated at any distance from the safe, thence through a wire, *d'*, to and through the case C, and to either one of the springs *c* or one of the plates *p*. A portion of the said springs and plates within the case C is so connected by short connecting-wires *d''* as to form a continuation of the circuit to one of the conductors *e*, which carries on the circuit into the plates, springs, and connecting-wires within the hollow door when said door is shut; thence the circuit passes through the conductors *e'* back again into and through another portion of the springs *c* and plates *p* in the case C and to the wire *d'''*, which leads back to the battery D, completing the circuit. The direction of the said main circuit may be reversed without in any wise affecting the action of the several devices described.

The arrangement of the springs *c*, plates *p*, and wires *d''*, for securing continuity of the circuit, may be much varied, and it is not necessary that springs should form part of said circuit. A special conductor may be carried by each plate, leaving the springs to perform solely the function of springs. Any mode of forming the said circuit so that the pressing away of any of said yielding insulators from the conducting-plate *p* (against which said plate normally rests) will break the circuit may be employed. I therefore do not confine myself to any particular number of yielding insulators *b*, conducting-plates *p*, springs *c*,

and connecting-wires *d''*, or to any particular arrangement of the same for securing continuity of the circuit.

It will now be seen that, in the normal position of the yielding insulators *b* and springs *c*, the main circuit hereinbefore described is closed; consequently the spring-armature F of the electro-magnet E will, in the undisturbed apparatus, be attracted to the electro-magnet E when the battery D is in working order.

To the said armature F is attached a pivoted lever, G, and when the main circuit is broken the spring *h* will draw the armature F and the lever G away from the magnet E. This movement sets into operation the alarm hereinafter described.

The alarm may consist of a bell, I, or other instrument for making a sound or noise, operated by an electro-magnet, E', Fig. 4, said magnet being magnetized by a local circuit from a battery, D', whenever said circuit is closed. Said alarm constitutes no part of my invention, but the mechanism for setting it into operation and controlling its operation are special features of my improvement, which will be sufficiently illustrated by a description of the same as applied to the operation of a bell-alarm sounded by a hammer, *k*, attached to a vibrating armature, *l*, Fig. 4.

The local circuit is as follows: Said circuit is closed, as shown in Fig. 5, when the main circuit is broken and the armature F is released, the closing of said circuit being effected by the contact of the lever G with a jointed lever, H, hereinafter described, which forms part of said circuit.

The full circuit is shown in Fig. 4, first from the battery D', through the wire *m*, to and through the coil of the electro-magnet E', thence through the wire *m'* to and through the lever G, thence through the jointed lever H and its metallic bearing to and through the wire *m*, connected with said lever H, back to the battery.

The lever H has its fulcrum at *n*, in a frame or case, C', which also supports a train of clock-work, O. By suitable intermediate gearing a cam-wheel, P, (shown in detail in Figs. 6, 7, and 8,) attached to said clock-work train, is caused to revolve twice in twenty-four hours. In the perimeter of said cam-wheel are formed two intersecting cam-grooves, *p'*, in which slides a plate, *r*, connected with a pivot, *s*, in the end of the jointed lever H. In one of the grooves *p'* a part, *t*, is made deeper than the other part of the same, as shown in Fig. 8. Said deeper part is of a length corresponding to that part of the clock-dial which marks the time of day during which the alarm-signal is not desired to sound—as, for instance, during the business-hours, from nine to four o'clock; and when the said deeper part of the said groove passes under the sliding pivoted plate *r*, said plate sinks by its own weight, (or may be assisted by a spring to sink to the bottom of said deeper part,) and raises the opposite end of the lever H into a position where it cannot touch the end of the armature-lever G. Therefore, while said deeper part of said groove is passing under said pivoted plate *r*, the local circuit of the alarm will not be closed, no matter how often the main circuit is broken by the opening of the safe-door in the transaction of business.

But I do not confine myself to a double-grooved cam-wheel revolving twice in twenty-four hours. I may use a cam-wheel revolved by suitable gearing once in twenty-four hours, in which case the plate *r* on the end of the said lever need not be pivoted to said lever; or in such case the arm of the lever nearest the cam-wheel might be made heavier than the other arm, and provided with a pin or projection playing in the groove of the cam-wheel; or an ungrooved eccentric cam-wheel might be made to act directly against the lever.

The use and operation of the apparatus, so far as now described, are as follows:

The safe may be placed in a counting-room, bank, or other place of business, and the wires of the main circuit to and from the battery D secretly led through the case C, and connected with the series of springs and plates within the case, as hereinbefore described. Said main circuit will then be closed whenever the door B of the safe is shut.

The local-alarm circuit or circuits and alarm or alarms may be placed at any distance away from the safe to be protected—say, in the residence or residences of bank officials or partners in business, in a police-station, or other situation where an alarm will be given to those desired to protect said safe in case the same is tampered with; and during the hours in which such alarm or alarms are permitted to operate by the controlling clock-work train, if any attempts be made to pierce said safe by any instrument, one or other of the yielding insulators *b* will be displaced, and the main circuit will be broken. Also, if the door of the safe should be opened, the conductors *e e* and *e e'* would be separated, and break the main circuit.

The breaking of said main circuit demagnetizes the electro-magnet E, which then releases its armature F. The spring *h* then pulls the said armature and its attached lever G away from the said electro-magnet, and brings said lever into contact with the lever H, closing the local-alarm circuit, and setting the alarm into operation.

To keep the local-alarm circuit closed and keep the alarm sounding, even if the main circuit should again be closed after opening, I form on that end of the lever H which comes in contact with the armature-lever G a catch, *v*, and also form on the end of said lever H an inclined plane, *w*. When, in the release of the armature F, the end of the lever G meets the end of the lever H, the inclined plane *g* on the end of the lever G slides over the inclined plane *w*, and the catch *v* engages the end of the said

armature-lever, and holds the local circuit closed. The alarm then continues to sound until some one who has charge of it opens said local circuit again.

The said opening of said local circuit is accomplished from the outside of the case C′ by means of a circuit-breaker, R′, which may conveniently be a rock-bar having on it a lifting-arm, r', and a spring, w'', for restoring it to its position when turned, and a winch, W′, for actuating it; but any other means of lifting the lever H to break the local circuit may be employed. When the said circuit-breaker is turned so as to bring the lifting-arm r' under the lever H, the latter is raised and the local circuit is broken.

To test the said local-alarm circuit, it is only necessary to press away the armature-lever G from the magnet E and bring it into contact with the lever H. This is conveniently done by means of a circuit-closer, R, having attached thereto the rock-lever r and a spring, w', for restoring it to its position when turned, and a winch, W, for turning it. When the said circuit-closer R is turned so that the rock-lever r presses the armature-lever G away from the magnet E, and into contact with the lever H, the local circuit is closed without breaking the main circuit, and it may at once be determined whether the alarm sounds properly or not.

During holidays, or other days when the place in which the safe is kept remains closed, it is necessary to release the local alarm from the control of the clock-work train. To effect this I employ a releasing device, R″, which holds up the end of the lever H nearest the cam-wheel P, and prevents said lever from being acted upon by said cam-wheel.

Said releasing device may conveniently be a rock-bar, having attached thereto a lifting-arm, r'', and a winch, W″, for turning the same. When said releasing device is turned so as to bring the lifting-arm r'' under the lever H, the end of the said lever under which said arm presses is raised and held raised until the said rock-bar is turned back again, and in this position the local circuit will be closed and the alarm sounded at any hour of the day in which the main circuit may be broken. But in this position of the lever H, if it were made of a single continuous bar, the lever G would not be engaged by the catch v on the lever H, because the inclined plane g on said armature-lever could not pass under the inclined plane w on the end of the lever H. Therefore the local-alarm circuit would be broken, and the alarm would cease to sound the moment the main circuit was again closed.

As it is desirable that the alarm should, under all circumstances, continue to sound after the closing of the main circuit, until stopped by some one interested in the protection of of the safe, I provide for the certain engagement of the armature-lever G with the lever H, when the latter is set for holidays, by a pivoted joint, s', in said lever, so constructed that the part of said lever between the said joint and the catch v may move upward against the pressure of a spring, t', without moving the entire lever.

I claim—

1. The combination of the yielding overlapping non-conductors or insulators b, the springs controlling said insulators, and a series of conductors rendering the electric circuit continuous through the interior of the protecting-case when the door of the same is closed, substantially as and for the purpose described.

2. The combination of the armature-lever G and the locking-lever H, both forming a part of an alarm-circuit, and the wires of the opposite poles of the battery of said circuit, one wire of which is connected with the said armature-lever and the other with the said locking-lever, substantially as and for the purpose described.

3. The combination, with the locking-lever H, for locking the armature-lever G, of clockwork and a cam-wheel driven by said clockwork, for preventing the closing of the alarm-circuit during prescribed periods of time, substantially as specified.

4. The combination, with the locking-lever H and the armature-lever G, each forming part of an alarm-circuit, of a circuit-closer, R, for testing said circuit, substantially as described.

5. The combination, with the locking-lever H and armature-lever G, both forming a part of an alarm-circuit, of a circuit-breaker, R′, for opening said circuit, substantially as and for the purpose set forth.

6. The combination, with the locking-lever H, forming part of an alarm-circuit, and clockwork for actuating the same, of a releasing device, R″, for releasing the said lever from the action of the clockwork, substantially as and for the purpose specified.

7. The joint s' in the locking-lever H, for enabling said lever to lock the armature-lever G, when the said lever H is engaged by the releasing device R″, substantially as described.

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Witnesses:
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