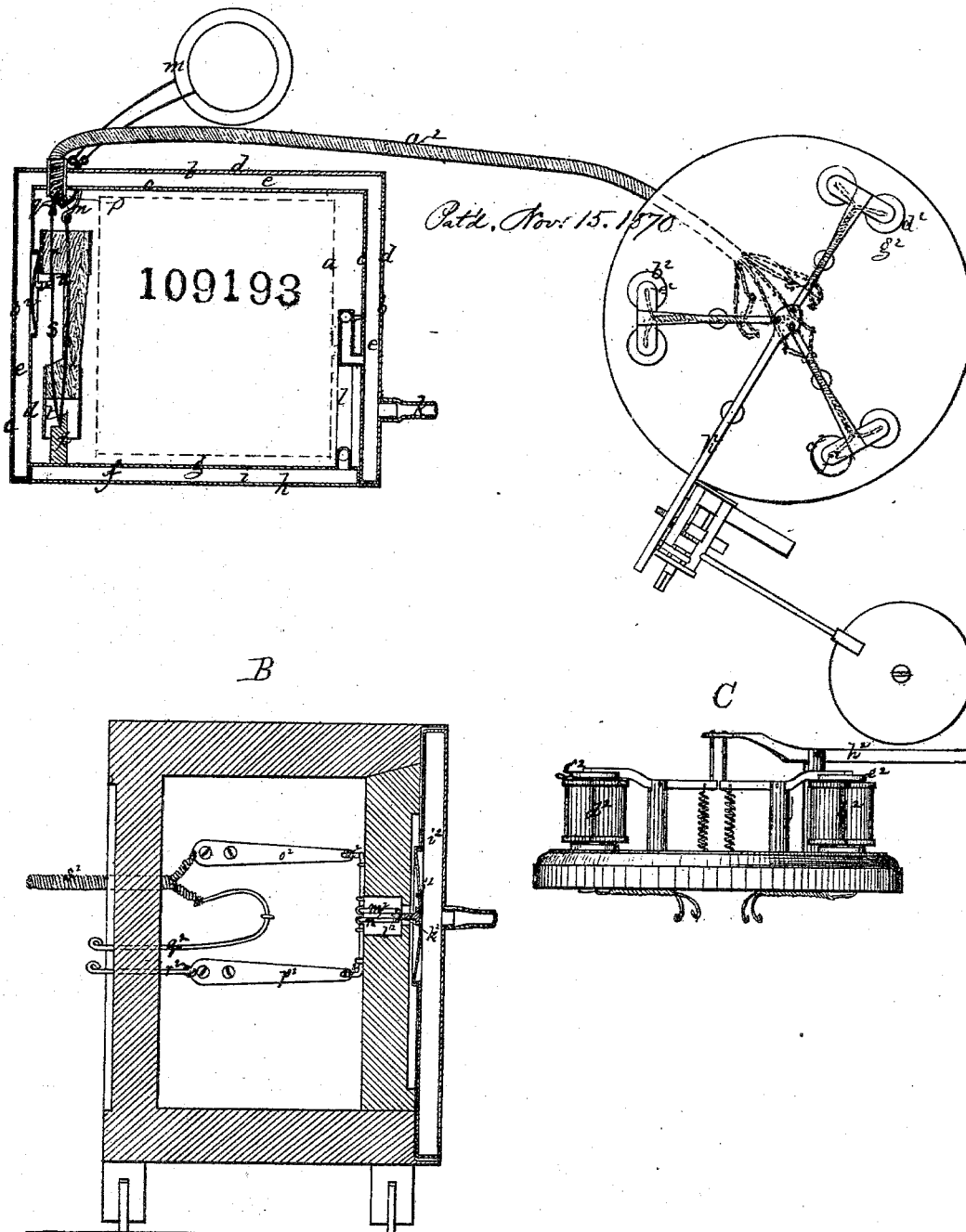


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W. DUNCAN & C. C. ROWELL.  
ELECTROMAGNETIC APPARATUS FOR PROTECTING SAFES.



Wm Duncan & C. C. Rowell  
by their attys.

Witness  
S. B. Rider  
do. W. Frothingham.

# United States Patent Office.

WILLIAM DUNCAN AND CALVIN C. ROWELL, OF LEBANON, NEW HAMPSHIRE.

Letters Patent No. 109,193, dated November 15, 1870.

## IMPROVEMENT IN ELECTRO-MAGNETIC APPARATUS FOR PROTECTING SAFES.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that we, WILLIAM DUNCAN and CALVIN C. ROWELL, of Lebanon, in the county of Grafton and State of New Hampshire, have jointly invented an Improvement in Protecting Safes; and we do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of our invention sufficient to enable those skilled in the art to practice it.

Our invention relates to an improved method of protecting safes from burglarious depredations, for which an application for Letters Patent has been filed by WILLIAM DUNCAN, one of the parties to this application, said method consisting in so combining or connecting the safe with an electric circuit, (composed of a battery and a magnetic coil and armature,) that the opening of the door or the perforation of any one of the walls of the safe, or of a surrounding closet or case, breaks the circuit and gives an alarm, the armature of the magnetic coil being connected to an alarm apparatus, so that the retraction of the armature by its spring, when released from the magnet, operates an alarm.

Our invention consists in combining with the safe or safe-inclosing closet, and an electric circuit and alarm apparatus, a cable or compound circuit-wires, and a series of magnetic coils and armatures, so arranged that the breaking of the circuit of any one of the coils will set the alarm in operation, our object being, by means of this assemblage of wires in the cable, to prevent the circuit from being completed outside of the safe, so that it would remain closed, and thus prevent the operation of the alarm, even if the safe were broken into and opened.

The safe shown at A in the drawing is inclosed within an outer safe or closet, the cable or circuit-wires being directly connected with the inclosing-case.

At B the cable is shown as applied directly to or as directly connected with the door of the safe.

In the first view, which shows the inclosing-case in horizontal section, the dotted lines *a* denote the outer boundary of the safe.

*b* denotes the case or closet which surrounds or incloses the safe.

This case is made with hollow walls, or each wall is composed of two plates, *c d*, between which is an air-tight space, *e*.

The door *f* is made with similar plates, *g h*, having between them an air-space, *i*.

Communicating with the main air-chamber, through its outer plate, is a pipe, *k*, by means of which, with the aid of an air-pump, the air may be more or less exhausted from the chamber *e* and from the door-

chamber *i*, the space *i* communicating with the space *e* by means of a flexible pipe, *l*.

From an electric battery, *m*, two wires pass through the walls or plates *c d*, one of them, *n*, connecting with a plate or spring, *o*, and the other with one wire, *p*, of a main circuit, which, passing out through the plate, extends to and connects with a magnetic coil, the second wire, *q*, of the circuit being connected inside the plate *c* with another plate or spring, *r*, which, by an intervening spring or finger, *s*, makes connection with the spring *o* and completes the circuit, the finger *s* and plate *o* touching at *t*, and the finger *s* and plate *r* touching at *u*, this being the position which the parts assume when the safe is inclosed and the door of the inclosing-case is shut, and the air is exhausted or partially exhausted from the air-chambers.

From the finger *s* a pin, *v*, projects toward the face of an expanding and collapsible disk, *w*, in the inner wall-plate *c*, and, when the air is drawn from the main air-chamber, this disk collapses and assumes the position seen in the drawing, concaving from the inside of the case. In this position the end of the pin is close to it, and if, by the operations of any person attempting to effect an entrance to the safe, a break or perforation is made at any point either through either of the outer wall-plates or through the outer door-plate, the in-rush of air will expand the disk, causing it to press inward against the pin, and push the end of the finger *s* away from the end of the plate *r*, thus breaking the circuit. Such break of the circuit of course releases the armature, which, being drawn back by its spring, is made to trip the alarm mechanism and give an alarm.

The air-exhaust tube may lead from the door-chamber or from any part of the wall-chamber, and these chambers may be disconnected and each have an exhaust-tube.

To provide for breaking the circuit by opening the door, the adjacent or outer ends of the two springs or fingers *o s* are held in contact (when the door is closed) by an insulated knob or projection, *x*, which, when the door is closed, presses the end of one finger against the other, and thus closes the circuit, the release of the pressure of the knob upon the fingers, which is effected by opening the door, causing the fingers to separate and break the circuit.

As with but two main circuit-wires it would be quite easy for a skilled burglar to complete the circuit outside the safe, so that it would remain closed notwithstanding the circuit-plates or fingers inside the safe might be separated, we form the connection between the safe and the armature mechanism by compound or cable circuit-wires and an assemblage of magnetic coils, there being to each coil and armature two cir-

cuit-wires, the several pairs of wires and their respective coils and armatures making an equal number of complete circuits, all of which will be broken by the perforation of any one of the plates of the safe or the opening of the door, and every one of which it will be necessary to complete outside the safe, to prevent the successful operation of the alarm by such perforation of the safe-plates or opening of the door.

In the drawing we show a cable,  $a^1$ , having three pairs of main circuit-wires properly wrapped or covered, and three coils,  $b^1$ ,  $c^1$ , and  $d^1$ , and armatures  $e^1$ ,  $f^1$ ,  $g^1$ , the break of any one of the circuits causing the released armature or armature-lever to be operated by a spring, and the movement of any one or more of the armature-levers tipping a lever,  $h^1$ , which is connected to an alarm apparatus, and by its movement releases the alarm and sets it operation.

A side elevation of this armature mechanism is seen at C.

In the modification shown at B, in which only the door of the safe is shown as protected, the air-chamber  $i^2$  of the door has a collapsible disk,  $j^2$ , from which an insulated pin,  $k^2$ , projects, the end of this pin having a metal connector,  $l^2$ , that normally (or when the door is closed and the air-chamber is exhausted) unites two wires  $m^2$   $n^2$ , the opposite ends of which bear against two plates,  $o^2$   $p^2$ , that unite with the battery-wires  $q^2$   $r^2$ , and with the main circuit-wires  $s^2$ , leading to the magnetic coil or coils with which the alarm apparatus is connected.

Air being exhausted from the chamber  $i^2$  when the door is closed the wires  $m^2$   $n^2$  are united by the metal

connector  $l^2$ , and the ends of the wires touch the respective plates  $o^2$   $p^2$ .

If a break or hole be made through the outer plate of the door, the disk  $j^2$  will expand or fly outward, pushing the metal connector away from the wires, bringing the insulated pin between them, and thus breaking the circuit and giving the alarm.

In like manner, if the door be opened, the circuit will be thereby broken, because the ends of the wires  $m^2$   $n^2$  will be thrown away from the plates  $o^2$   $p^2$ .

The magnetic coils and alarm apparatus may be located in any convenient position, the circuit-wires being properly conducted thereto.

In conclusion, we would state that we do not claim, broadly, the safe or safe-inclosing closet or case so constructed and connected with an electric circuit and alarm that a break or perforation through the plates of the safe, or the opening of the door of the safe or case will break the circuit and operate the alarm. This feature is the sole invention of WILLIAM DUNCAN, one of the parties hereto, and has been made by him the subject of a separate application for Letters Patent; but

What we claim as our joint invention is as follows:

In combination with a safe and an electric circuit and an alarm apparatus, the compound circuit-wires or cable, and series of magnetic coils and armatures, arranged to operate substantially as described.

WILLIAM DUNCAN.  
CALVIN C. ROWELL.

Witnesses:

E. J. DURANT,  
Y. E. DURANT.