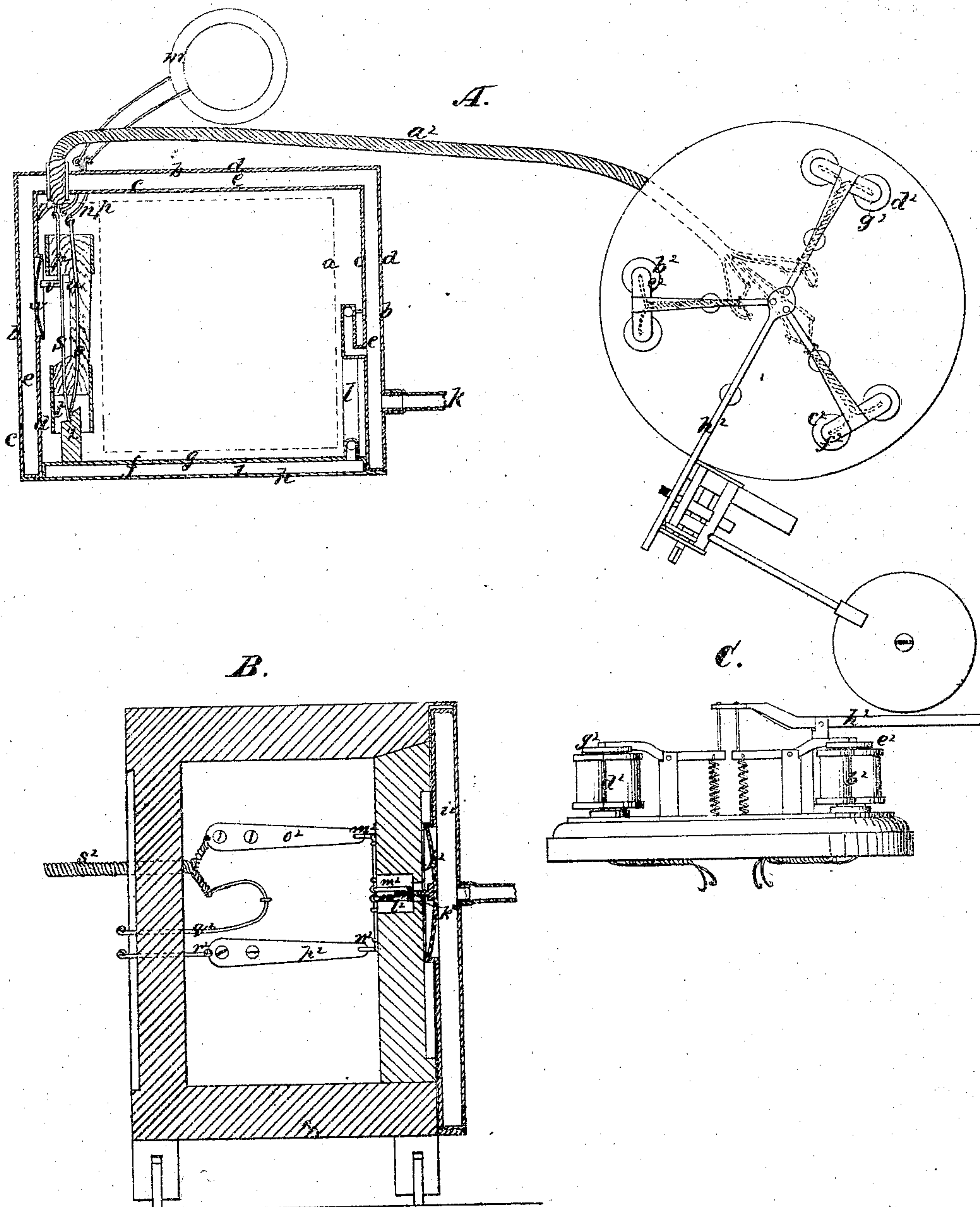


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William Duncan,
Imp^t in Protecting Safes.

PATENTED AUG 1 1871



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM DUNCAN, OF LEBANON, NEW HAMPSHIRE, ASSIGNOR TO HIMSELF
AND CALVIN C. ROWELL, OF SAME PLACE.

IMPROVEMENT IN ELECTRO-MAGNETIC SAFE-PROTECTORS.

Specification forming part of Letters Patent No. 117,713, dated August 1, 1871.

To all whom it may concern:

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

My invention relates to an improved method of protecting safes from burglarious depredations by 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 with an alarm apparatus, so that the retraction of the armature by its spring, when released from the magnet, operates an alarm. My invention consists primarily in a safe, or safe-inclosing closet, so constructed and connected with an electric circuit and an alarm apparatus that the opening of a door, or the perforations of the outer plate of the door, or either outer plate of the safe, shall break the circuit, the breaking of which operates an alarm apparatus.

The drawing represents two safes, each embodying my invention.

The safe shown at A is inclosed within an outer safe or closet, the improvement being directly connected with the inclosing-case. At B the improvement 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-door 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, *b*. 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, through either of the outer wall-plates or through the outer door-plate, the inrush 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 finger, 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 of the safe, so that it would remain closed, notwithstanding the circuit-plates or fingers inside the safe might be separated, I prefer to form the connections 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 circuit-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 I show a cable, a^2 , having three pairs of main-circuit wires properly wrapped or covered, and three coils, b^2 , c^2 , and d^2 , and armatures e^2 , f^2 , g^2 , the break of any one of the circuits causing the released armature or armature-lever to be operated by its spring, and the movement of any one or more of the armature-levers tripping a lever, h^2 , which is connected to an alarm apparatus, and by its movement releases the alarm and sets it in operation. A side elevation of this armature mechanism is seen at C.

The above-described combination of the cable or compound circuit-wires and the assemblage of magnetic coils and armatures to operate the alarm is not, however, here claimed, as it is the invention of Calvin C. Rowell, of Lebanon, New Hampshire, and myself, jointly, and has, therefore, been made the subject of a separate application for Letters Patent.

In the modification shown at B (in which only the door 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.

It will be obvious that many modifications may be made in the arrangement of the mechanism without departing from the essence of the invention.

The air or vacuum-chambers may be differently constructed or arranged, and instead of exhausting air from such chambers, and operating the alarm by the expansion of a disk or heads, the chambers may be expanded by forcing air into them under pressure, and the alarm be operated (through the electric circuit) by the collapse of the disks or chamber-heads.

Having now described my invention and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is as follows:

1. In combination with a safe, an electric circuit and an alarm apparatus, the safe (or an inclosing-case) being so constructed and connected with the circuit, and the circuit with the alarm, that a break or perforation through the plate or plates of the safe or case, or the opening of the door of such safe or case, breaks the circuit and operates the alarm.

2. In combination with a safe and with an electric circuit and an alarm apparatus, the air-chambers, air-exhaust pipes, and expanding and collapsing disks, arranged and operating substantially as described.

3. The specific construction and arrangement of the circuit-closing and breaking mechanism shown at A and B.

WILLIAM DUNCAN.

Witnesses:

W. W. CULVER,
O. D. HILDRETH.