

(No Model.)

2 Sheets—Sheet 1.

A. W. HALL.
BURGLAR ALARM.

No. 315,140.

Patented Apr. 7, 1885.

Fig. 1.

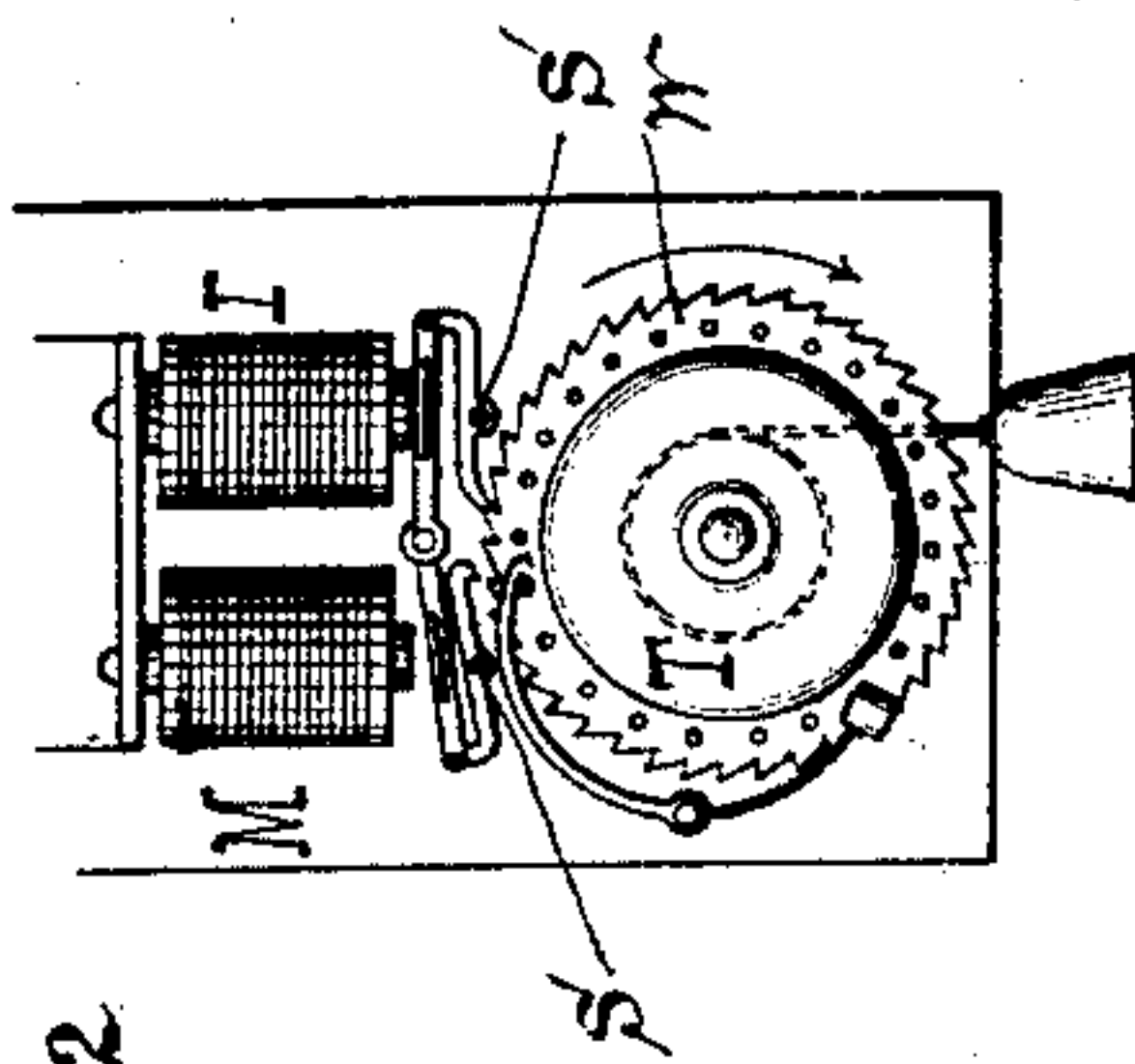
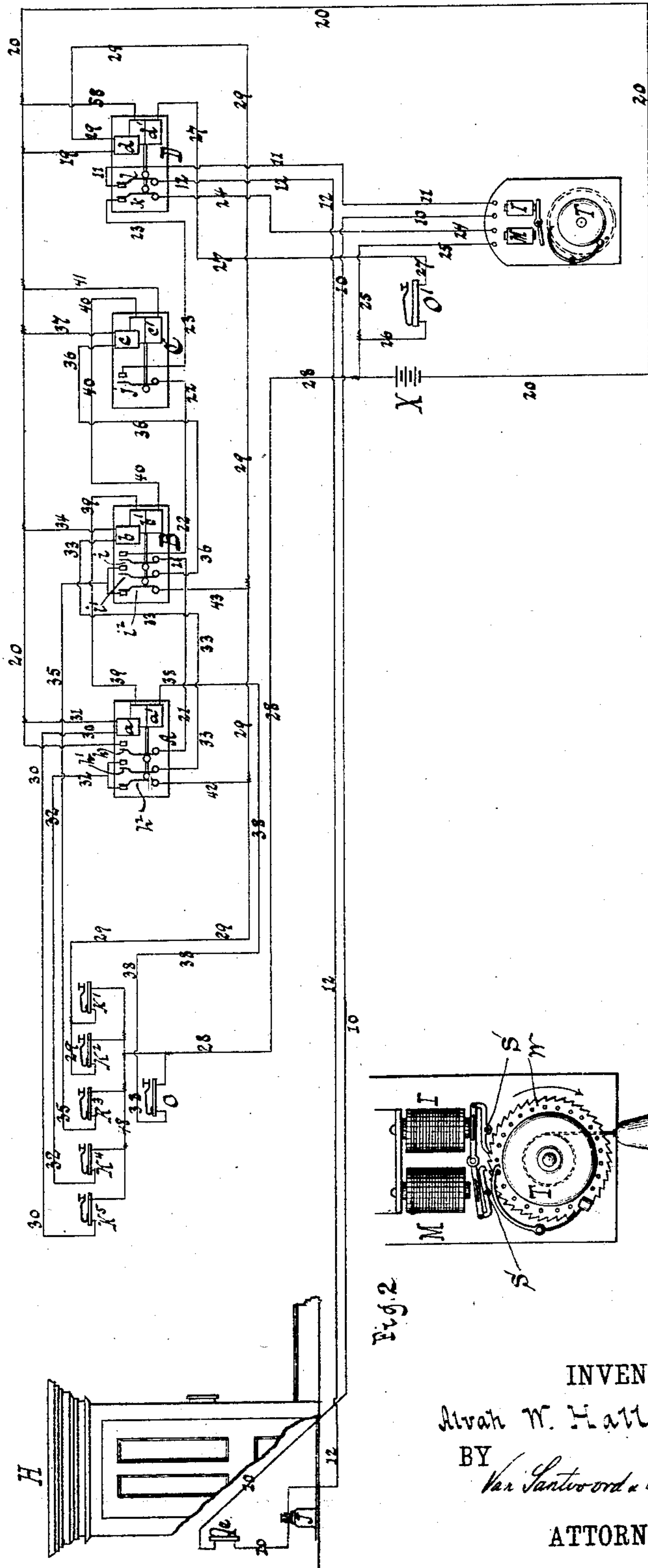


Fig. 2.

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BY *Van Santvoord & Knapp*
ATTORNEYS

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3

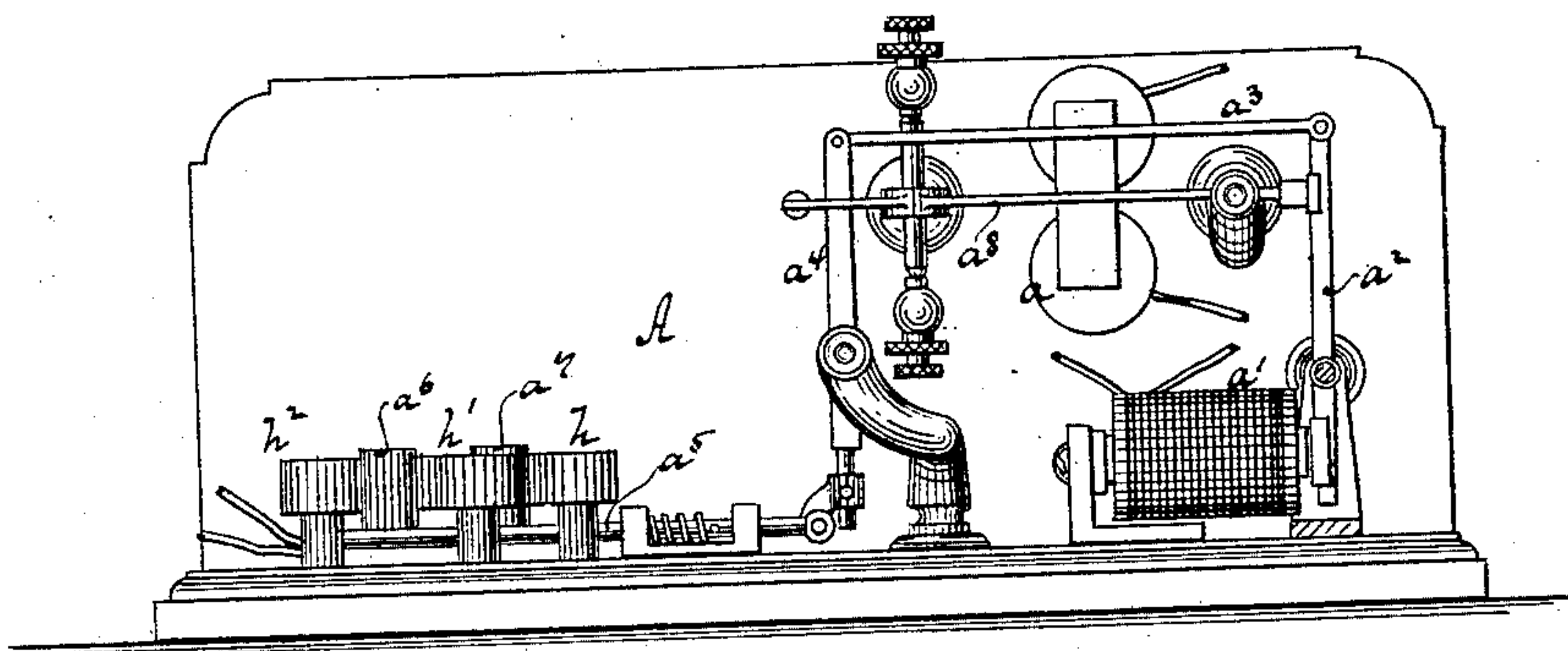
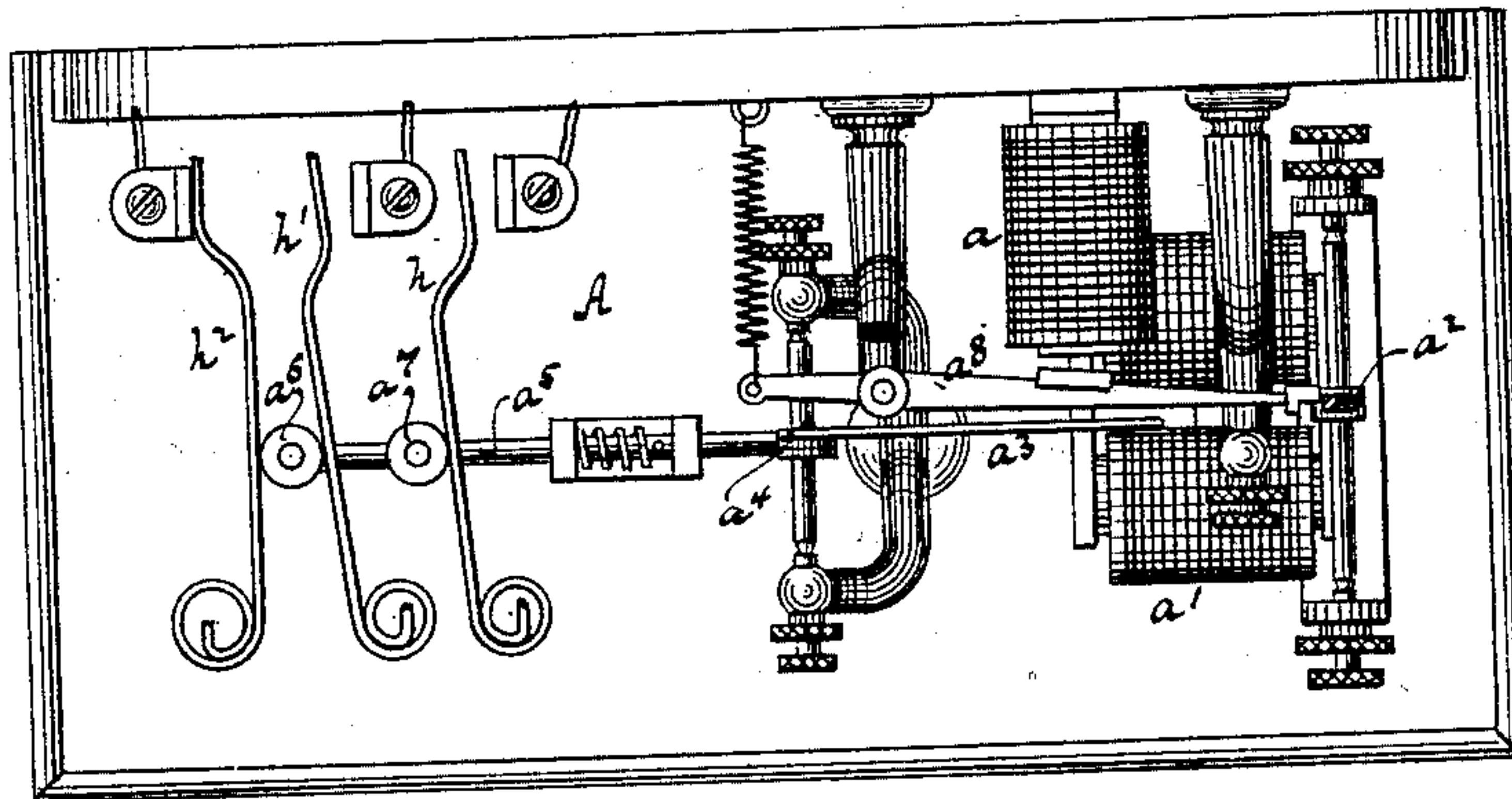


Fig. 4



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UNITED STATES PATENT OFFICE.

ALVAH W. HALL, OF MERIDEN, CONNECTICUT.

BURGLAR-ALARM.

SPECIFICATION forming part of Letters Patent No. 315,140, dated April 7, 1885.

Application filed August 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALVAH W. HALL, a citizen of the United States, residing at Meriden, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Burglar-Alarms, of which the following is a specification.

In what are commonly known as "electrical burglar-alarm systems" the object is to give intimation, by means of an audible or other signal at a given point, of any attempt to open a door or in any way to gain access to the structure or receptacle which it is intended to protect against intrusion.

The applications of the system, while numberless, involve, generally, a circuit between the structure or receptacle to be guarded and the place where the signal is to be given, which circuit is broken or closed or otherwise affected by the act of or attempt at intrusion, and so caused to sound the alarm. For example, the doors and windows of a building are provided with circuit making or breaking devices, so that any movement of them operates the said devices and gives an alarm in a certain room in the building, or at some distant station communicating by an electric circuit with the building. In the same way the doors of safes, the lids of boxes or chests, and, in fine, all kinds of receptacles are protected, so that unwarrantable intrusion cannot be effected without sounding an alarm at some more or less remote point.

In another application of even date herewith I have described a system of this kind, to which are applied certain improvements and features of novelty invented by me, of which the general nature and objects will be now described so far as may be necessary to a clear understanding of the improvements which form the subject of this application.

The purpose or object of the invention is to give instant warning at any predetermined point of the unauthorized entrance of or access to any electrically-protected building, safe, or other receptacle, and to provide a means whereby those authorized to open the doors of the protected structure may do so without sounding the alarm. For this purpose I use two circuits between the protected structure and the signal-station. One of these circuits

ism, and the other electrically-operated devices arranged to control the alarm mechanism, whereby a person who desires to gain access to the protected structure may, by the proper manipulation of the keys or contacts that connect with the controlling devices, prevent the sounding of the alarm; but inasmuch as the proper manipulation of the keys should be a secret known only to those who are authorized to open the protected structure without sounding the alarm, I employ a series of electrically-controlled circuit-closers, similar in principle to relays, which, together with the keys or contact-makers and circuit-connections, form an electrically-controlled combination analogous in theory to those used in certain mechanical locks. These devices, which, for convenience, will be herein designated "double-circuit instruments" are arranged in such manner that through the instrumentality of one of the series the sounding of the alarm is prevented, whether by making or breaking the alarm-circuit, by shunting the current around the alarm-magnets, or by such similar action as the case may require; but such condition or operation of the said instrument can only be maintained or effected by the previous operation of one of the others, or by more than one in a predetermined order, and the keys or contacts are connected with the several double-circuit instruments so that this may be done; but if the wrong key be depressed the combination is disarranged and the alarm is sounded.

The special means of preventing the ringing of the alarm described in my application above referred to consists in a circuit or branch which, in the case of a closed-circuit system, is completed through the alarm-magnet by the combination when properly operated, or, in the case of an open-circuit system, is caused to shunt out the magnet.

My present invention consists in another way of controlling the alarm, the same being an improvement in many respects over that described, inasmuch as it simplifies the system and affords more perfect protection.

According to my present invention I combine with the alarm-magnet a second magnet in a circuit or branch controlled by the combination of double-circuit instruments, the two magnets being so arranged as to cause the

alarm to sound when the receptacle is opened or when the combination is tampered with, but to prevent the alarm from being sounded by the opening of the receptacle when the combination has been properly operated. A great many modifications of this arrangement will suggest themselves to persons skilled in the art. For instance, the alarm may be operated by the magnet either through the instrumentality of mechanical devices alone or of electrical and mechanical means combined, and the magnets themselves may be used in a great many different relations, as will appear from the description of the special means which I have shown as the most practical and efficient of which I am aware.

In the accompanying drawings, Figure 1 is a diagrammatic representation of the system embodying my improvements. Fig. 2 is an elevation of the alarm mechanism which I employ. Fig. 3 is a side view of a double-circuit instrument such as is used in making up the electrical combination. Fig. 4 is a plan or top view of the same.

Let H represent a structure or receptacle to be protected and provided with any ordinary circuit-breaker arranged to interrupt the circuit with which it is used when the door of the structure is moved. From the structure H runs a circuit to a given point or station. This circuit includes the circuit-breaker in the structure H, a battery, J, one of the alarm-magnets, I, located in the station, and is formed by the wires 10 11 12. The alarm in this case is a mechanical alarm-bell, T, and is operated by the following means: Two magnets, M I, one placed in position to move stops or detents S, connected with their armatures into or out of engagement with the wheel W, forming part of the train that rings the bell. The detents S are pivoted in such relations to the wheel W that when one or both of the magnets are active the wheel is locked; but when both are demagnetized the wheel is released and the alarm sounded. At the alarm-station are located a series of double-circuit instruments, A B C D, the number being an arbitrary one, as will hereinafter more fully appear. In principle of operation these instruments are similar to that described by me in a patent granted September 11, 1883, No. 284,840.

In Figs. 3 and 4 the details of instrument A are illustrated. Referring to said figures, a' designates one electro-magnet; a^2 , its armature-lever, which connects by a rod, a^3 , with a lever, a^4 , the lower end of which connects with a rod, a^5 , which carries two roller-studs, a^6 a^7 . The letter a designates another magnet, the armature-lever a^8 of which serves to lock the armature-lever of the magnet a' whenever the latter, being rendered active, moves or shifts its armature. The armature a^2 is held by the lever a^8 until magnet a is energized. When the circuit of magnet a' is closed, the roller-stud a^6 closes the front contact-spring, h^2 , while the back contact-springs, h' h , remain off their stops, and this

condition is maintained after the interruption of the circuit of magnet a' , and until the magnet a is energized. Then the armature-lever a^2 falls back, the front contact-spring leaves its stop, and the back contact-springs, h' h , are brought into contact with their stops. Instruments C and D differ from that described only in this respect: Instrument C has a single back contact-spring, j , only, and the instrument D has two front contact-springs, k l , only. Instrument B is in all respects similar to that designated A.

The magnets a' b' c' , which may be regarded as the main magnets, are in a branch, 38 39 40 41 20, of the controlling-circuit 28, that runs to some point near the protected structure H. The main portion 28 of this circuit contains a battery, X, and is connected with the several branches that form the return-circuit by keys or contact-makers. The key O connects it with the branch 38, 39, 40, 41, and 20, which contains the magnets a' b' c' , and this key is depressed so as to energize the magnets and lock their armatures in order to set the apparatus or bring it into operative condition. A branch, 26, 27, 58, and 20, containing a key, O', includes the magnet d' , and is to be closed at the outset or after the alarm has been sounded in order to set the instrument D and complete the signaling-circuit through the wires 10, 11, and 12 and spring l .

In order to permit the door of the structure H to be moved without sounding the alarm, I place in the vicinity of the structure H a certain number of keys or contact-makers, K' K^2 , &c., one of the points of each being connected with the battery X by wires 28 48. From the other points or contacts run wires 30 32, &c., back to the double-circuit instruments. A branch wire, 25 24, from wire 28 includes the supplemental magnet M and connects with the spring k of instrument D. This branch when completed is formed through the wires named, wires 23 22 21 20, and the springs of the several instruments to which the said wires are connected. The object in the present case is then to complete this circuit by the successive operation of the double-circuit instruments, so that magnet M may be energized and circuit 10 11 12 broken by opening the structure H without sounding the alarm. The connections are such in the present case that keys K^5 K^4 K^3 must be depressed in the order named to operate first the instrument A, then B, and finally C. Any other order, or the depression of either key K^2 or K' , would break the circuit through magnet I and sound the alarm. Depressing key or contact-maker K^5 closes the branch 30 20, which includes the secondary or releasing magnet of instrument A. Normally the strip or spring h^2 of this instrument is in contact with its stop and springs h' h out of contact with their respective stops; but as soon as magnet a is energized this condition of things is reversed. Wire 21 is connected to spring h , so that it is brought into connection with wire 20, leading back to bat-

tery X, and the wire 32 of the branch, including K⁴, is connected by spring h' with wire 33. Key K⁴ is then depressed. This completes the circuit through the branch 32 33 34 20 5 and energizes magnet b of instrument B, connects wires 22 and 21 through spring i and wire 35 from key K³ with wire 36. By depressing then key K³ the circuit is completed through branch 35 36 37 20 and magnet c of 10 instrument C energized. This connects wire 22 with 23, which completes the circuit through the magnet M and locks the alarm. The structure H may then be opened and circuit 10 11 12 broken without sounding the alarm. 15 When the structure H is again closed, the combination is reset by depressing key O, which energizes magnets a' b' c' and reverses the order of connections, as above described.

If any other key than those designated, K⁵ 20 K⁴ K³, be depressed in attempting to operate the combination, or if these keys be depressed in the wrong order, the result will be the sounding of an alarm. For instance, if after depressing key K⁵ a key, as K², be touched, 25 instead of K⁴, the branch 29 19 20, including the magnet d of instrument D, is closed, the spring l, through which the alarm-circuit is closed, is carried away from its stop and the alarm sounded as both magnets M and I would 30 be inert, so if one of the keys, as K⁴, be depressed out of its proper order, the branch 32 42 29 19 20 is closed through the spring h² of instrument A and the alarm sounded. These examples serve as illustrations of the work- 35 ing of the system. After the magnet d has broken the alarm-circuit the circuit is again closed by depressing the key O', as above described.

To vary the combination, it is only necessary to vary the order of connections between 40 the keys and double-circuit instruments. In my application, to which reference has been made, I have described for this purpose a detachable or variable key.

45 It will be understood from the foregoing description that the number of figures constituting a combination is practically unlimited. As an instance of one simple arrangement, suppose a number of operating keys or contacts 50 are used and only one of the number is to be used for preventing the alarm, it would be necessary to use only two double-circuit instruments. The operating-key bearing the figure corresponding to that selected as the combination would connect with the first double- 55 circuit instrument and the circuits from all the other keys would run to the second double-circuit instrument.

In order to open the receptacle without 60 sounding the alarm, the proper key must be depressed. If any other key is depressed, the alarm will be sounded. In the same manner,

if it is desired to use two keys to make the combination, three double-circuit instruments would be used which should be connected upon 65 the same principle as described. By increasing the number of keys and the number of the double-circuit instruments an unlimited number of combinations may be provided for.

Having now described the nature and pur- 70 pose of my improvements and shown in what respects the same may be modified and varied without departing from my invention, what I claim is—

1. In a burglar-alarm system, the combination, with a structure to be protected, a signal-station, and two circuits connecting the same, of an electro-magnetic burglar-alarm connected with one of said circuits, a magnet in the other circuit for controlling the operation of the alarm, and electrical devices for 80 operating the magnet, as and for the purpose set forth.

2. In a burglar-alarm system, the combination, with a structure to be protected, a signal-station, and two circuits connecting the same, of an electro-magnetic alarm in one of said circuits, a magnet for controlling the same included in the other circuit, a series of double-circuit instruments for operating said magnet, 90 and keys for actuating the double-circuit instruments, as herein set forth.

3. In a burglar-alarm system, the combination, with a structure to be guarded, a signal-station, and two circuits connecting the same, 95 of an alarm controlled or operated by an electro-magnet in one of said circuits, an electro-magnet in the other arranged to prevent the operation of the alarm, and a series of double-circuit instruments and keys in branches of 100 the circuit for operating said magnet, as and for the purpose set forth.

4. In a burglar-alarm system, the combination, with a structure to be guarded, a signal-station, and two circuits connecting the same, 105 of an alarm controlled or operated by an electro-magnet in one of said circuits, an electro-magnet in the other arranged to prevent the operation of the alarm, a series of double-circuit instruments and keys connected in 110 branches of the circuit to form an electrically-operated combination for operating the said electro-magnet, and a double-circuit instrument connected with the other instruments and with the alarm-magnet for causing the 115 same to sound when the combination is disarranged, as and for the purpose specified.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

ALVAH W. HALL. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.