

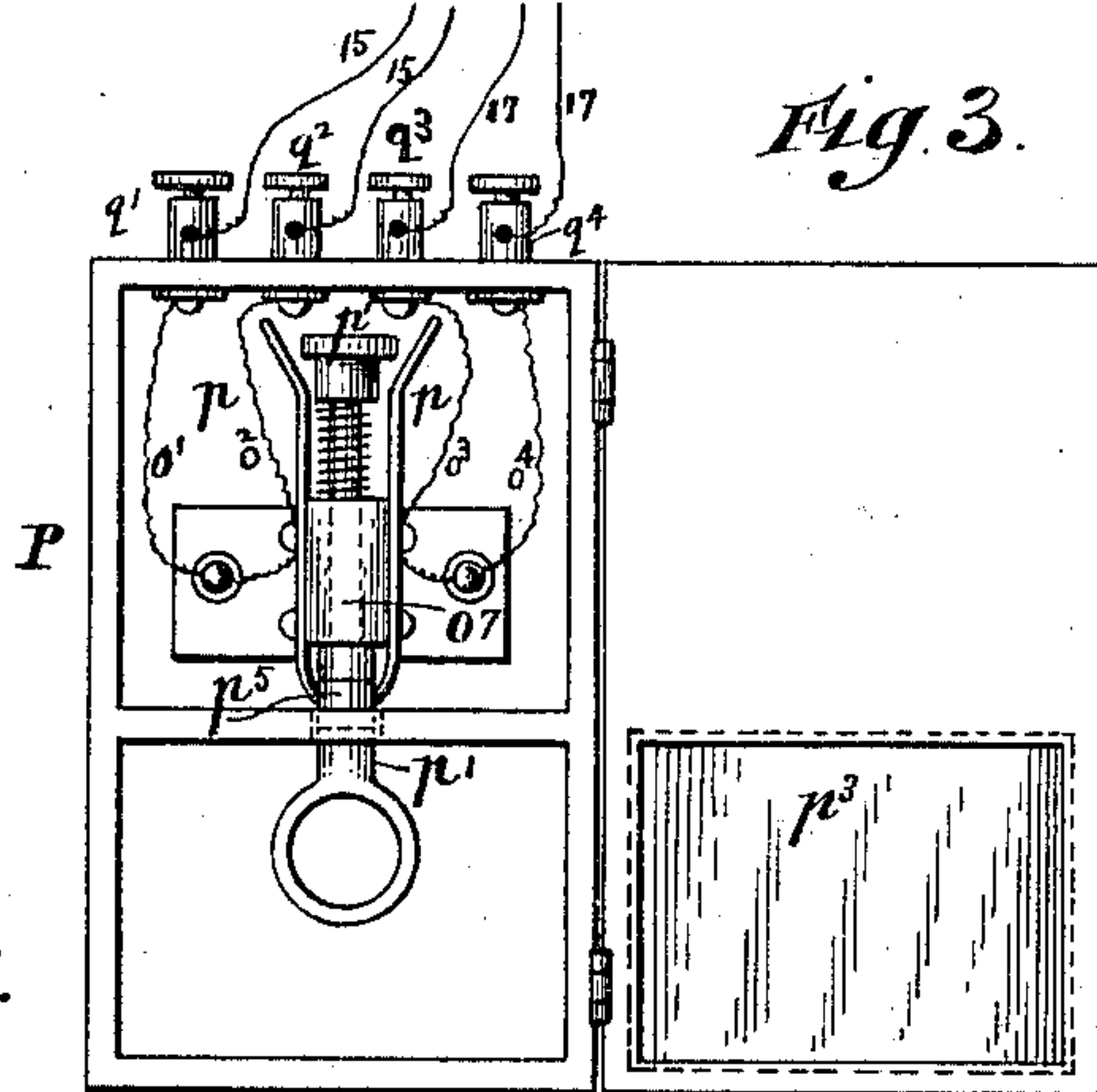
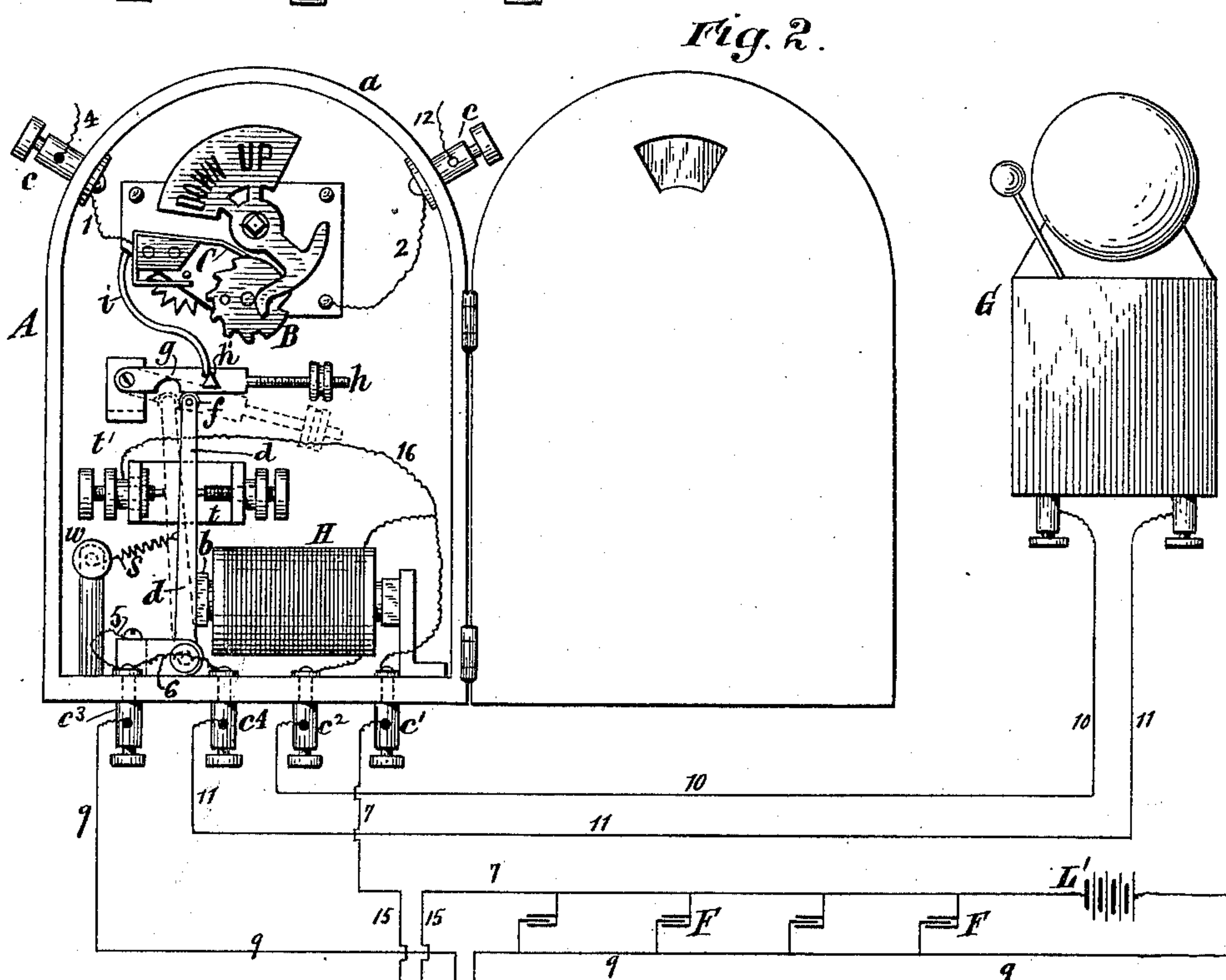
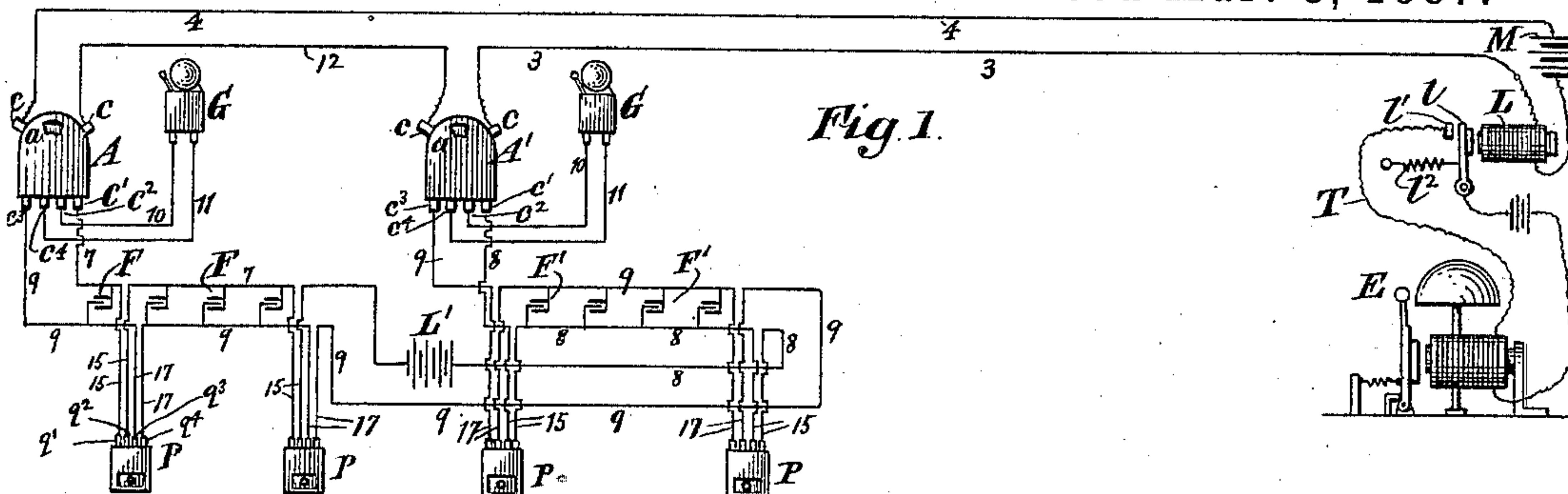
(No Model.)

F. G. LYON.

FIRE ALARM.

No. 358,864.

Patented Mar. 8, 1887.



Witnesses
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UNITED STATES PATENT OFFICE.

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FIRE-ALARM.

SPECIFICATION forming part of Letters Patent No. 358,864, dated March 8, 1887.

Application filed June 23, 1886. Serial No. 206,496. (No model.)

To all whom it may concern:

Be it known that I, FRANK G. LYON, of Jersey City, county of Hudson, and State of New Jersey, have invented a certain new and useful Improvement in Fire-Alarms, of which the following is a specification.

My improvement relates to apparatus employed to give a signal of the occurrence of a fire in a building or room.

I will describe in detail apparatus embodying my improvement, and then point out the novel features in claims.

In the accompanying drawings, Figure 1 illustrates the manner of connecting up in circuit two or more signaling-instruments employed in my improvement. Fig. 2 is a front elevation of one of the signaling-instruments on a larger scale and having the cover open. Certain circuit-wires and appurtenances are also shown in this figure. Fig. 3 is a front view of a hand signaling-instrument, the cover being swung open.

Similar letters of reference designate corresponding parts in all the figures.

A A' designates signaling-instruments having suitable cases, *a*. Each of these instruments consists of a train of wheels of any suitable construction operated by a spring or weight. Upon one of the arbors of the train is rigidly mounted a toothed circuit-break wheel, B. A metallic spring, C, bears at one of its ends upon the periphery of the circuit-break wheel B, and is secured at the other of its ends to a piece of insulating material, the train of wheels, not excepting the supporting-frame, being preferably made of metal.

The spring C and the frame of the train of wheels are connected by wires 1 2 with binding-posts *c*, and to the latter are also connected wires 3 4 12, which form the main circuit of the fire-alarm, extending from the place to be protected to an office where watchmen are stationed. When the spring C is in contact with one of the teeth of the circuit-break wheel B, the main circuit is closed. While it remains closed no signal will be transmitted to the office where watchmen are kept, because the indicating-instrument E in said office is such that it will not operate until the main circuit is broken or opened. Every time the spring C is out of contact with the circuit-break wheel, owing to the passage of a tooth

beyond its end, the main circuit is opened, and the bell of the indicating-instrument E is caused to sound.

The main circuit 3 4 12 includes the wires of an electro-magnet, L, and an electric battery, M. The armature *l* of this electro-magnet has connected to it one end of a local circuit, T, which includes a battery and the coils of the electro-magnet of the indicating instrument or bell E. It has its other end connected to a piece of metal, *l'*. A spring, *l''*, pulls the armature *l* over against the piece of metal *l'* each time the main circuit is opened, and thereupon the local circuit is closed and the bell E caused to ring.

It is one of the objects of my improvement to transmit to the office where watchmen are stationed a different signal from each of the signaling-instruments A A'. This is accomplished by varying the number or arrangement of the teeth of their circuit-break wheels B.

Each of the signaling-instruments will preferably have duplicate springs or weights for operating its train of wheels, in order that its operation shall be insured.

The signaling-instruments A A' are intended to operate to give a signal of fire or an undue variation of temperature at the places where they are located. They may be caused to operate by the variation of temperature, or they may be operated by the hand of any one present, as I will fully explain.

In each of the instruments A A' is an electro-magnet, H. One end of its wire coils is connected to a binding-post, *c'*, and the other end to a binding-post, *c''*, affixed to the case of the instrument. The armature *b* of this electro-magnet is mounted upon a metallic lever, *d*. When the armature is not attracted by the electro-magnet it is retracted by a spring, *s*, connected at one end to the lever *d* and at the other to a thread attached to a windlass or pin, *w*, on which it may be more or less wound to vary the tension of the spring. From the armature-lever *d* a wire, 5, extends to a binding-post, *c''*, and from this wire 5 a wire, *b*, extends to a binding-post, *c'*. The lever *d*, when the armature *b* is attracted by the electro-magnet H, is vibrated against a stop, *t*. Whenever the electro-magnet H is de-energized, the spring *s* will vibrate the lever *d*

over against the contact-piece t' , which is in electrical communication with the binding-post c' through the intermediate wire, 16.

The train of wheels, which includes the circuit-break wheel B, is, after being wound up, prevented from running down before the desired time by means of a block or dog-lever, i , having a detent that engages with one of the wheels in the train. A lever, h , fulcrumed at one end to a bracket affixed to the case of the signaling-instrument and provided at the other end with an adjustable weight, extends over the upper end of the lever d , resting upon a small roll, f , with which the upper end of the lever d is provided. The lever h is provided with a projection or pin, h' . When the lever h is supported in its uppermost position by the lever d , the projection or pin h' holds the block or dog-lever i in such position that it will keep the train of wheels from running down. The lever h is provided on its under side, and near its fulcrum, with a notch, g . When the lever d is drawn over against the contact-piece t' by the spring s , the notch g of the lever h will be over its upper end, consequently the lever h will fall, and its notch g will embrace the upper end of said lever d , whereupon the latter will be held by the lever h in the position it occupies until an attendant shall raise the lever h and the lever d shall be vibrated over against the stop t . When the lever h falls, as just explained, it releases the block or dog-lever i , and the latter then permits the train of wheels to operate. This results in the sending of a signal to the office where watchmen are stationed. After the notch of the lever h has engaged the upper end of the lever d the electro-magnet H, even if energized during the operation of the circuit-break wheel, cannot interfere with the signal which the latter is designed to produce. The watchmen will be apprised by the signal that there is something wrong in the building protected by the fire-alarm, and as each of the signaling-instruments A A' gives a distinct signal, owing to the distinctive structure of its circuit-break wheel B, the watchmen will know on what floor or in what part of the protected building the trouble exists.

On one of the arbors of the trains of wheels is mounted a plate, which may be of segmental shape, and has marked upon it the words "Up" and "Down." The cover of the case of each signaling-instrument has an arc-shaped opening, through which the word "Up" or the word "Down" may be seen, according to the position occupied by the plate bearing these words. When the train of wheels in the instrument is properly wound up, the word "Up" will be visible; but when it has run down the word "Down" will be visible through the opening in the cover. This opening may have a piece of glass fitted into it.

A wire, 7, extends from the binding-post c' of the signaling-instrument A to one pole of an electric battery, L', but it is interrupted at intervals and has pairs of wires 15 extending

from it to binding-posts $q' q^2$ of hand shunting-instruments P. From the other pole of this battery L' a wire, 8, extends to the binding-post c' of the signaling-instrument A', but it is interrupted at intervals and has pairs of wires 15 extending from it to the binding-posts $q' q^2$ of hand shunting-instruments P. A wire, 9, extends from the binding-post c^3 of the latter to the binding-post c of the signaling-instrument A, but this wire is interrupted at intervals and has pairs of wires 17 extending from it to binding-posts $q^3 q^4$ of the instruments P. The binding-posts $q' q^2$ are electrically connected by wires $o' o^2$ in the instruments P, and the binding-posts $q^3 q^4$ are electrically connected by wires $o^3 o^4$ in the instruments P; hence the wires 7, 8, and 9, although in fact interrupted, are practically continuous wires.

Between adjacent portions of the wires 7 and 9 thermostats F are arranged, their contact-points being in electrical communication with these wires. Between adjacent portions of the wires 9 and 8 thermostats F' are similarly arranged, so that their contact-points will be in electrical communication with these wires.

The binding post c^2 of each signaling-instrument A A', it will be remembered, has one end of the wire coils of the electro-magnet H of that instrument connected to it. It has also connected to it a wire, 10, that extends to a binding-post which is electrically connected to one end of the coils of an electro-magnet controlling the operation of a bell in an instrument, G. The other end of the wire coils of this electro-magnet is electrically connected to a binding-post from which a wire, 11, extends to the binding-post c^4 of the same signaling-instrument. It will be remembered that the binding-post c^4 is in electrical communication with the armature b of the electro-magnet H of the signaling-instrument through the wires 6 and 5. The bell of the instrument G is rung by clock-work whenever the electro-magnet which controls its operation is demagnetized so as to be no longer able to check or block it.

The wires 7 and 9 and the wires 8 and 9 extend adjacent to one another throughout the portions of a building to be protected. For instance, the wires 7 and 9 will extend parallel to each other over one floor, with the thermostats F arranged at intervals between them, and the wires 8 and 9 will extend parallel to each other over another floor, with the thermostats F' between them.

Normally, while the desired temperature is maintained in the building protected by the fire-alarm, an electric current from the battery L' will flow along the wire 7 to the binding-post c' and the coils of the electro-magnet H of the signaling-instrument A, thence to the binding-post c^2 , and along the wire 10 to the coils of the electro-magnet of the bell-instrument G belonging to the signaling-instrument A, thence along the wire 11 back to the binding-post c^4 of the signaling-instrument A, and thence along the wire 6 to the wire 5 and bind-

ing-post c^2 of this signaling-instrument. From this binding-post c^3 the circuit continues along the wire 9 to the binding-post c^3 of the signaling-instrument A'. Thence it extends along the wire 5 to the wire 6 and binding-post c^4 of the signaling-instrument A', thence along the wire 11 to the coils of the electro-magnet of the bell-instrument G belonging to the signaling-instrument A'. From the coils of this electro-magnet it extends along the wire 10 to the binding-post c^2 of this signaling-instrument and the coils of the electro-magnet H thereof. From the latter it extends to the binding-post c' of this signaling-instrument, and thence along the wire 8 to the battery L'.

The thermostats F F' are so constructed that their contact-pieces will be brought together by any material variation of temperature, either increase or decrease. This is represented diagrammatically in the drawings, where one of each pair of contact-pieces extends on both sides of its fellow.

The wires 7 and 9, where they run parallel, have connected to them at intervals the wires 15 and 17, which are connected by the wires $o' o^2 o^3 o^4$ to contact-pieces p of the hand shunting-instruments P. These contact-pieces of each of the instruments P are made of spring metal—such as brass—and are connected to an intermediate block of insulating material, o^7 . A rod of metal, p' , is fitted to slide in the block o^7 . Its lower portion is larger in diameter than the portion that fits the block o^7 , and has a collar, p^5 , of insulating material, against which the lower ends of the contact-pieces extending below the block o^7 bear while the rod occupies its normal position. At this time the upper end of the rod, which is enlarged to form a head, occupies a position between the upper ends of the contact-pieces; but as the latter are bent so as to diverge, the head of the rod will not touch them. A spring coiled around the rod below the head, but above the block o^5 , maintains the rod normally in this position, pressing and holding it upward as far as the enlarged lower portion will permit. While the rod occupies this position the contact-pieces p will not be in electrical communication.

The lower end of the rod p' is provided with a ring or hand-piece, by which it may be operated. By pulling down the rod its enlarged head will be brought into contact with the upper portion of the contact-pieces p , and the lower ends of the latter will spring inward as soon as the large lower portion of the rod is moved below them. They will thus be in electrical communication with each other, because in contact with the metal of the rod; also, they will form stops, preventing the rod from being moved upward again.

It is to be understood that when the hand shunting-instrument is operated, the electro-magnet of the signaling-instrument A A' with which it is normally in circuit, is shunted out of the local circuit, resulting in giving the

predetermined signal at the station where watchmen are kept.

The case of each instrument P may be made of wood or other suitable material and of any desirable shape. As shown it is rectangular. It has a cover connected to one side by hinges, and provided at the other side with a lock, whereby it may be secured when closed. It will be seen by reference to Fig. 3 that there is a partition in the case. Only the lower extremity of the rod p' extends below this partition. The portion of the cover which comes opposite the portion of the case below the partition has inserted into it a plate of glass, p^3 . The cover of the case is intended to be kept locked. If any one desires to use the instrument, he can break the plate of glass and reach the ring or hand-piece of the rod p' . After the rod shall have been pulled down it will be kept down by the lower ends of the contact-pieces p engaging with the upper end of the large lower portion of the rod until some attendant of the fire-alarm having gone to the case of the instrument shall open the cover, disengage the contact-piece from the rod, renew the glass in the cover, and lock the cover again. Such attendant, when he examines the premises to discover the point at which an alarm originated, will naturally first examine the hand shunting-instruments P, from which examination he will be enabled to determine whether the alarm originated with any of the hand shunting-instruments or at another part of the circuit. In this manner the hand shunting-instruments serve the function of detectors.

In view of the fact that the hand shunting-instruments are locked, that portion of them which contains the detents cannot be reached by any one save the attendant having the key. I therefore prefer to designate the detents as "non-accessible."

Any material variation of the temperature in the building which is traversed by the wires 7 and 9 and 8 and 9 will cause the contact-pieces of the thermostats to be brought together. Assuming that this should take place with any of the thermostats F arranged between the wires 7 and 9, the coils of the electro-magnet H of the signaling-instrument A will be short-circuited or shunted out, and the electro-magnet of the bell-instrument G belonging to said signaling-instrument A will also be short-circuited or shunted out. The bell in this instrument will thereupon ring, giving an alarm to the inmates of the building protected by the fire-alarm, and indicating to them that there has been a material variation in the temperature. This will enable them to take such steps as may be necessary to restore the desired temperature; or, if there be a fire, to extinguish it. The magnet H being de-energized, the lever d will be vibrated over against the contact-piece t' , and the lever h will thereupon be permitted to drop. This will result in the release of the train of wheels in the signaling-instrument and the transmission of a

signal to the office where watchmen are stationed.

Owing to the contact of the armature-lever *d* with the contact-piece *t'*, the wire 7 will be in electrical communication through the binding-post *c'*, wire 16, contact-piece *t'*, armature-lever *d*, wire 5, and binding-post *c'* with the wire 9. The resistance of the electro-magnet H and the electro-magnet of the bell-instrument G will thus have been removed from the circuit.

As the circuit will have been closed by the meeting of the contact-pieces of the thermostats upon the variation of the temperature in their vicinity, and also by the contact of the lever *d* of the signaling-instrument A with the contact-piece *t'*, the signaling-instrument A' will not be affected so as to give an alarm, and the circuit will be in condition to enable the signaling-instrument A' to give an alarm if subsequently a variation of the temperature shall occur in the vicinity of the thermostats F'. The variation of temperature affecting the signaling-instrument A in manner described does not produce any tendency in the signaling-instrument A' to operate. On the contrary, the shunting out of the electro-magnet H of the signaling-instrument A and of the electro-magnet of the bell-instrument G belonging thereto, causes the electro-magnet H of the signaling-instrument A' and the electro-magnet of the bell-instrument G belonging to the latter to be strengthened, by reason of the reduction of resistance in the circuit extending through the building to be protected.

If through a variation of temperature the thermostats F' should at any time have their contact-pieces brought together, the signaling-instrument A' will be operated in the same manner as the signaling-instrument A has been described as operated.

Of course if a variation of temperature should occur not only in the vicinity of the thermostats F, but also in the vicinity of the thermostats F' at the same time, the result would be the release of the train of wheels in both the signaling-instruments A and A', and only a confused signal would be given at the office where watchmen are stationed; but it is so extremely improbable that a variation of temperature sufficient to operate the two sets of thermostats should occur at the same time, that it is practically impossible for a confused signal to be given in this fire-alarm by the simultaneous operation of two signaling-instruments through a variation of temperature.

It will be understood that every part of the local circuit extending through the building to be protected is normally in circuit. This is an important feature of the fire-alarm. A break of a wire, a corrosion of a wire or other part in circuit, a weakening of the battery, or an accident to the battery will result in demagnetizing the electro-magnets H of both signaling-instruments A A' simultaneously, whereupon the trains of wheels in both these

instruments will be simultaneously released, and the resulting confused signal will indicate the cause of the trouble to the watchmen at the office where they are stationed. This is of great importance, because it enables watchmen to immediately become aware of any fault with the apparatus. Such occurrences in the local circuit will always result in sounding alarms on the signaling-instruments G, thereby apprising the inmates of the protected premises that something is wrong with the circuit.

It may be remarked that if the circuit extending through the building to be protected should be grounded at a single point no effect would be produced upon it; but if grounded at more than one point the electro-magnets H of the signaling-instruments A A' would be de-energized and a confused signal would be given by the simultaneous operation of the trains of wheels in both signaling-instruments.

The hand shunting-instruments P are provided in order that any one present at the time of an incipient fire might, by operating them in the manner previously explained, shunt out the electro-magnet H of a signaling-instrument, A or A', and cause said instrument to transmit its signal to the office where watchmen are kept. In this way the signal may be given before it will be given by the operation of the thermostats.

I may advantageously form in the cores of the electro-magnets H longitudinal grooves in order to facilitate the demagnetization of said magnets.

It will be desirable to so construct the trains of wheels in the signaling-instruments A A' that several rotations of the circuit-break wheels, and consequently several repetitions of the signal transmitted, will occur before the trains of wheels run down.

The trains of wheels may, when run down, leave their circuit-break wheels in contact with the springs C, or out of contact therewith, as may be preferred, so as to leave the main circuit extending between the protected building and the office where watchmen are stationed normally closed or normally opened.

Although I have only shown two signaling-instruments with their appurtenances, yet there may be any desired number connected together or with the same main circuit.

It will be observed that in my fire-alarm I employ a number of signaling-instruments in a continuous local circuit, and that each of these instruments may be shunted out of such local circuit by a shunting or short-circuiting thermostat or hand shunting-instrument without opening or closing the circuit. By this means all the instruments in the local circuit except the one so shunted or short-circuited out are still operative to protect the premises included in the balance of the circuit.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an apparatus for indicating fires or variations in temperature, the combination of

a main circuit, an office where watchmen are kept, a local circuit at premises to be protected, a number of signaling-instruments in said local circuit, and shunting or short-circuiting thermostats in said local circuit, substantially as specified.

2. In an apparatus for indicating fires or variations in temperature, the combination of a main circuit, an office where watchmen are kept, a local circuit at premises to be protected, a number of signaling-instruments in said local circuit severally adapted to give a distinct signal, and shunting or short-circuiting thermostats in said local circuit, substantially as specified.

3. In an apparatus for indicating fires or variations in temperature, the combination of a series of signaling-instruments severally adapted to give a distinct signal, an office where watchmen are stationed, a main circuit extending from the signaling-instruments to the said office, a local circuit at premises to be protected in which said signaling-instruments are connected up, and thermostats in said local circuit, all being arranged and combined substantially as described, whereby in case of fire or variations in temperature a predetermined signal will be sent from one of the signaling-instruments, but in case of weakening of or accident to battery or break or corrosion of wire or other part in the local circuit a confused signal will be sent from the instruments.

4. In an apparatus for indicating fires or variations in temperature, the combination of a number of signaling-instruments severally adapted to give a distinct signal, an office where watchmen are stationed, a main circuit extending from the said signaling-instruments to the said office, a local circuit at premises to be protected, and hand shunting-instruments connected with said local circuit and adapted to cause the predetermined signals to be given at the office where watchmen are kept, substantially as specified.

5. In an apparatus for indicating fires or variations in temperature, the combination of a number of signaling-instruments severally adapted to give a distinct signal, an office where watchmen are stationed, a main circuit extending from the said signaling-instruments to the said office, a local circuit at premises to be protected, and self-locking hand shunting-instruments connected with said local circuit and adapted to cause the predetermined signals to be given at the office where watchmen are kept, substantially as specified.

6. In an apparatus for indicating fires or variations in temperature, the combination of a series of signaling-instruments severally adapted to give a distinct signal, an office where watchmen are kept, a main circuit extending from the signaling-instruments to the said office, a local circuit at premises to be protected, shunting or short-circuiting thermostats in said local circuit, bell-instruments controlled by

electro-magnets, also in said local circuit, operated to give a signal in case of action of the thermostats, or weakening or accident to battery, or break or corrosion of wire or other part in the local circuit, substantially as specified.

7. In an apparatus for indicating fires or variations in temperature, the combination of a series of signaling-instruments severally adapted to give a distinct signal, an office where watchmen are kept, a main circuit extending from the signaling-instruments to the said office, a local circuit at premises to be protected, and shunting or short-circuiting devices in said local circuit, whereby the operation of one signaling device results in increasing the magnetism of the electro-magnets of the others, and therefore increases their ability to resist unlocking, substantially as specified.

8. In an apparatus for indicating fires or variations in temperature, the combination of a series of signaling-instruments severally adapted to give a distinct signal, an office where watchmen are kept, a main circuit extending from the signaling-instruments to the said office, a local circuit at premises to be protected, bell-instruments controlled by electro-magnets, also in said local circuit, and shunting or short-circuiting devices in said local circuit, whereby one of the signaling-instruments and a bell-instrument may be shunted or short-circuited out and the magnetism of the magnets of all the other instruments increased, substantially as specified.

9. In an apparatus for indicating fires or variations in temperature, the combination of a series of signaling-instruments severally comprising a train of wheels adapted to give a distinct signal, and an electro-magnet controlling the operation of the train of wheels, a main circuit extending from the trains of wheels of the signaling-instruments to an office where watchmen are stationed, a local circuit at premises to be protected in which said signaling-instruments are connected up, and thermostats in said local circuit, whereby in case of fire or variation in temperature a predetermined signal will be sent from one of the signaling-instruments, but in case of weakening of or accident to battery or break or corrosion of wire or other part in the local circuit a confused signal will be sent from the instruments.

10. In an apparatus for indicating fires or variations in temperature, the combination of a series of signaling-instruments severally adapted to give a distinct signal, an office where watchmen are stationed, a main circuit extending from said signaling-instruments to said office, a local circuit at premises to be protected, hand shunting or short-circuiting instruments in said local circuit, and inaccessible detents for locking said instruments after the same have been operated to cause a signal to be sent to said office, substantially as specified.

11. In an apparatus for indicating the variations in temperature, the combination of a signaling-instrument comprising a mechanical motor for producing a signal, an electro-magnet for controlling said motor, and a normally-closed electric circuit connected with said electro-magnet, said signaling-instrument having a lever carrying the armature for such electro-

magnet, the lever being provided at its extremity with a loose roller and operating in conjunction with a transversely-extending locking-lever, substantially as specified.

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Witnesses:

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