(No Model.)

H. A. CHASE & H. F. EATON.

FIRE ALARM APPARATUS.

No. 455,812. Patented July 14, 1891.

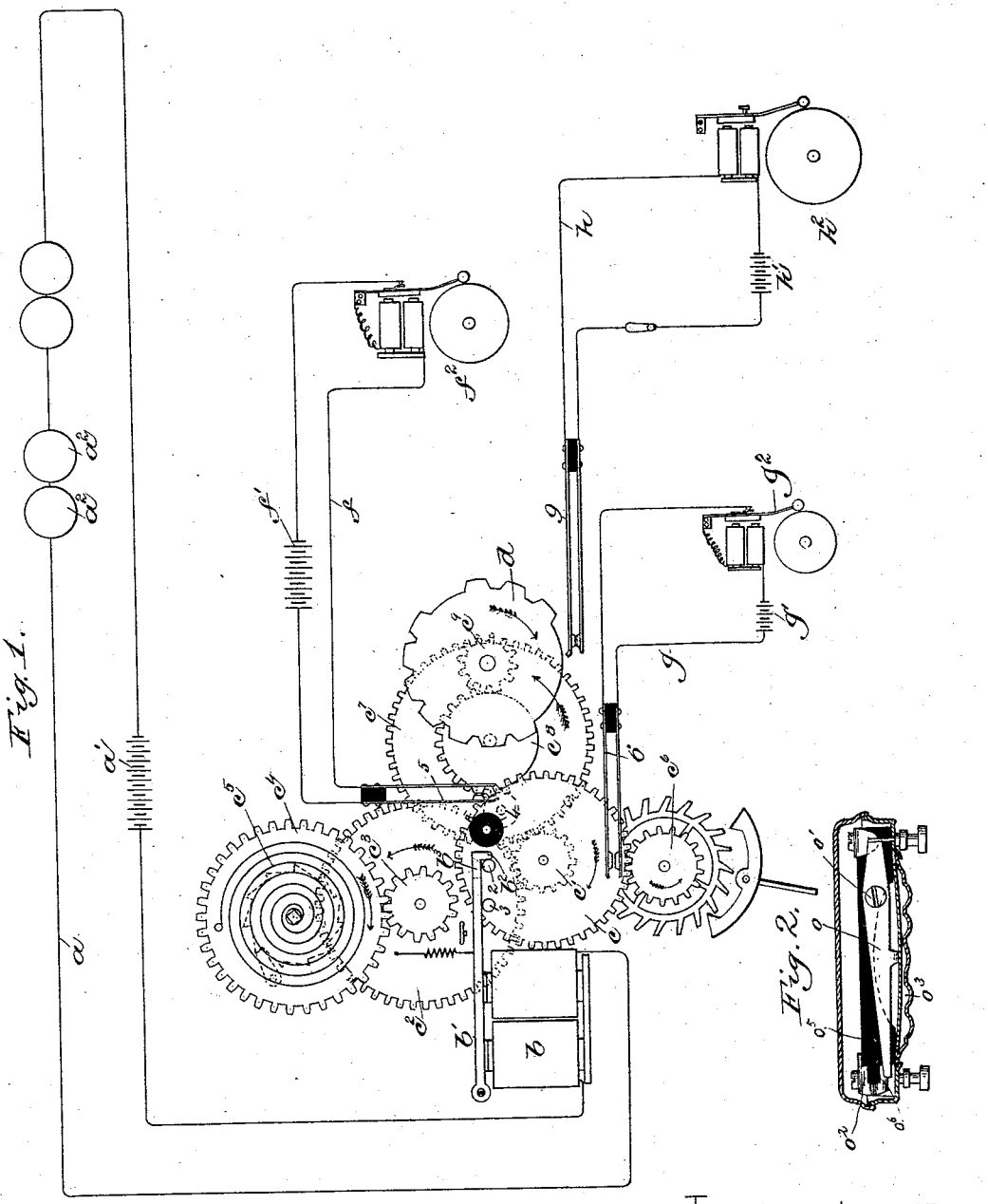

Fig. 1.

Fig. 2.

Witnesses.

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UNITED STATES PATENT OFFICE.

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FIRE-ALARM APPARATUS.

SPECIFICATION forming part of Letters Patent No. 455,812, dated July 14, 1891.

Application filed July 28, 1887. Serial No. 245,504. (No model.)

To all whom it may concern:

Be it known that we, HENRY A. CHASE, of Stoneham, county of Middlesex, State of Massachusetts, and HOWARD F. EATON, of Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Fire-Alarm Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

In thermostatic fire-alarm circuits now commonly arranged several thermostats are employed as circuit-changing devices and a suitable receiving apparatus is employed to respond to the changes in the circuit, the thermostats being placed upon the ceilings of the rooms of the buildings, and it has frequently happened that a single thermostat would be operated either accidentally or through some unknown cause, thereby causing the receiving apparatus to indicate a fire when none exists, which causes considerable trouble and annoyance.

This invention has for its object to construct a suitable receiving apparatus whereby such false alarms or accidentally-operated circuit-changing devices will at once be detected without causing the true fire-alarm to respond.

In the present embodiment of our invention the main circuit contains several circuit-changing devices — as thermostats, for instance—and a receiving-relay, the armature of which when effected by a change in the circuit—as when the circuit is broken, for instance—releases a motor mechanism which is normally wound. The motor mechanism when thus released effects the operation of a local alarm or displaces an inspector's card or some equivalent device and is immediately thereafter stopped, to be again released when the circuit is again changed, as when closed or restored to its normal condition, for instance. As the motor mechanism is a second time released it effects the operation of another local alarm, indicating that the circuit has been again changed or restored again to its normal condition. Means are also provided in connection with the motor mechanism, but forming a part of it, for controlling a third-alarm apparatus, as a bell in an engine-house, when the circuit has been a third time changed, as upon the opening of the circuit a second time, such opening of the circuit being caused by the operation of a second changing device or by a repetition of the operation of the same circuit-changing device.

When our invention is applied to thermostatic fire alarm circuits, as herein shown, upon the occurrence of a fire several thermostats will operate in succession, they being adjusted to respond to different temperatures.

Figure 1 shows in diagram a signal-receiving apparatus embodying our invention in connection with a thermostatic fire-alarm circuit, and Fig. 2 a cross-sectional detail of a thermostat such as may be employed.

The main circuit a contains a battery a' and several circuit-changing devices a^2, said circuit-changing devices being herein shown as thermostats of the kind shown and described in United States Patent No. 329,470, granted to M. Martin and illustrated in Fig. 2, yet we desire it to be understood that other forms of circuit-changing devices or signal-transmitting devices may be employed.

The thermostat herein shown comprises the circuit-changing lever o, pivoted at o' to a bar o^5 of insulating material, the outer or free end of which lever o bears upon a plate o^2 of conducting material. The plate o^2 has an opening or recess o^6, which exposes the bar o^5, and the extremity of the lever o passes over this recess in its movement from one to the other side of said plate o^2, and hence breaks the continuity of the circuit and immediately thereafter restores it again. A tank o^3, which is filled with expansible material, is employed to move the said circuit-changing lever o in one direction, and said lever is returned by pressing upon the projection o^7 on the lever. The receiving-relay b is also included in the main circuit, the armature-lever b' of which is provided with a detent b^2, which engages a stud or projection 2 of a toothed wheel c of the motor mechanism. The armature b' is provided at its rear side with another detent b^3, (see dotted lines,) which, when said armature is raised, lies in the path of movement of the stud or projection 3 on the wheel c, which it engages.

The toothed wheel c is mounted upon a

shaft carrying a pinion c', which is engaged by a toothed wheel c^2, mounted upon a shaft carrying a pinion c^3, which is in turn engaged by a toothed wheel c^4, mounted upon the shaft of the motor, upon which the main spring c^5 is mounted in any usual manner. The toothed wheel c meshes with a pinion c^6, fixed to the shaft carrying the escape-wheel. The pinion c' meshes with a toothed wheel c^7, fixed to a shaft carrying a pinion c^8, said pinion meshing with a pinion c^9, fixed to a shaft carrying a circuit-controlling wheel d. The toothed wheel c is provided with a stud or projection 4, which during the revolution of the said wheel first strikes one arm 5 of a circuit-closing key, which closes a local circuit f containing a battery f' and a bell f^2, and afterward strikes one arm 6 of a circuit-closing key, which closes a local circuit g containing a battery g' and a bell g^2. Either of the local circuits f or g may contain any other suitable instrument other than a bell, if desired. One-half of the pinion c^8 is deprived of teeth, so that as the wheel c makes one revolution and the said pinion one-half of a revolution in the direction shown by the arrows thereon the pinion c^9 will not be rotated, but as the wheel c makes a second revolution the pinion c^8 will engage and rotate the pinion c^9 one revolution, thereby rotating the circuit-closing wheel d. The peripheral projections of the wheel d, as said wheel revolves strike one arm 9 of a circuit-closing key, which closes a local circuit h containing a battery h' and a bell h^2 or other suitable receiving-instrument. The wheel d may be provided with any number of projections, as desired, to cause the bell h^2 to strike any number of times.

When using the thermostat as herein provided, should the circuit be opened permanently by a partial movement of the lever o or by a broken wire, the armature-lever b' will be retracted, permitting the wheel c to revolve until stopped by the stud 3 engaging the detent b^3 of the armature-lever, and during such movement of the wheel the stud 4 will strike the circuit-closing key and close the local circuit f, to thereby indicate that the line is open. If the line is opened momentarily—that is to say, opened and immediately thereafter restored to its normal condition—the wheel c will be released, and as the armature-lever immediately resumes its normal position said wheel will continue to make one revolution, and during such movement the stud 4 will close the circuit f for a short interval of time and afterward close the circuit g for a short interval of time, thereby indicating that the line has been opened and thereafter closed by the operation of one of the thermostats, such operation being caused either by fire or by some accident or unknown cause. In case of the occurrence of a fire two or more thermostats will operate, as they are preferably located near together and also preferably adjusted to respond to different temperatures in succession. When a second thermostat or one adjusted to a high temperature operates, opening and thereafter closing the line, the wheel c will be again released to make one complete revolution, and as said wheel makes its second revolution the circuit-closing wheel d will make one complete revolution, causing the bell h^2 to respond to the number upon the wheel, said bell being located, for instance, in the engine-house and the number indicating the building or floor of the building in or about which the fire is raging.

By this receiving apparatus herein described it will be seen that the bell h^2, indicating fire, will not respond until at least two thermostats have operated or the line opened and closed twice. As will also be seen, the receiving apparatus herein described will respond to changes in the main circuit produced by the brake-wheel, so that we do not desire to limit the scope of our invention to the employment of a thermostat or equivalent circuit-changing device, as automatic signal-transmitting devices of any character may be employed, and also, if desired, one or more receivers, such as f^2 g^2 h^2, may be employed, depending upon the application made of the receiving apparatus.

We claim—

1. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, a single receiving-relay and armature-lever therefor, and motor mechanism controlled by said armature-lever, combined with two receiving or indicating instruments, the operation of one of which is governed by the motor mechanism when the armature-lever is moved in one direction and the operation of the other of which is governed by said motor mechanism when the armature-lever is restored to its normal position, substantially as described.

2. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, and a single receiving-relay and its armature-lever, combined with two receiving or indicating instruments and motor mechanism controlled by said armature-lever, which operates one of the receiving-instruments when any one of the circuit-changing devices changes the condition of the circuit and which operates the other receiving-instrument when the condition of the circuit is restored, substantially as described.

3. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, a receiving-relay and armature-lever therefor, and a motor mechanism governed by both the forward and backward movements of the said armature-lever, combined with two receiving or indicating instruments controlled by the said motor mechanism, one of which operates when the armature-lever moves forward and the other when the armature re-

turns to its normal position, substantially as described.

4. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, a receiving-relay and its armature-lever therefor, and the wheel *c* and motor mechanism for moving it, said wheel having thereon studs which co-operate with detents of the armature-lever, as described, combined with two receiving or indicating instruments controlled in succession by said wheel *c*, substantially as described.

5. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, the receiving-relay and armature-lever responsive to the changes in the circuit, and motor mechanism the operation of which is controlled by said armature, the receiving or indicating instrument controlled by said motor mechanism when the armature-lever is responding to the restoration of the condition of the circuit and the circuit-wheel *d*, and receiving or indicating instrument controlled by it responsive to a second or repeated movement of the armature-lever, substantially as described.

6. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, and a receiving-relay and armature-lever responsive to the changes in the circuit, combined with a normally-wound motor mechanism and two stops, one of which is engaged by the armature-lever when retracted to thereby hold the motor mechanism, a receiving-instrument governed by the said motor mechanism as the armature moves from one to its other position, and another receiving-instrument governed by the said motor mechanism as the armature resumes its normal position, substantially as described.

7. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, and a receiving-relay and armature-lever responsive to the changes in the circuit, combined with a normally-wound motor mechanism and two stops, one of which is engaged by the armature-lever when retracted to thereby hold the motor mechanism, a receiving-instrument governed by the said motor mechanism as the armature moves from one to its other position and another receiving-instrument governed by the said motor mechanism as the armature resumes its normal position, and a circuit-wheel operated by the motor mechanism as the armature-lever repeats its movement, substantially as described.

8. In an electric circuit, circuit-changing devices constructed and arranged to change the condition of the circuit and thereafter restore it, and a receiving-relay and armature-lever responsive to the changes in the circuit, combined with a normally-wound motor mechanism held by the armature-lever, the electro-magnetically-operating receiving-instrument, the circuit of which is controlled by a circuit-wheel, as *c*, driven by said motor mechanism the first time the armature-lever responds to a change and restoration of the circuit, and another electro-magnetically-operating receiving-instrument, the circuit of which is controlled by another circuit-wheel driven by a motor mechanism and operative during the second time the armature-lever responds to a change and restoration of the circuit, the last-named circuit-wheel being formed to indicate a certain number or code-signal, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HENRY A. CHASE.
HOWARD F. EATON.

Witnesses:
BERNICE J. NOYES,
B. DEWAR.