(No Model.)

# C. BURGHER.

## AUTOMATIC FIRE ALARM SYSTEM.

No. 475,925. Patented May 31, 1892.

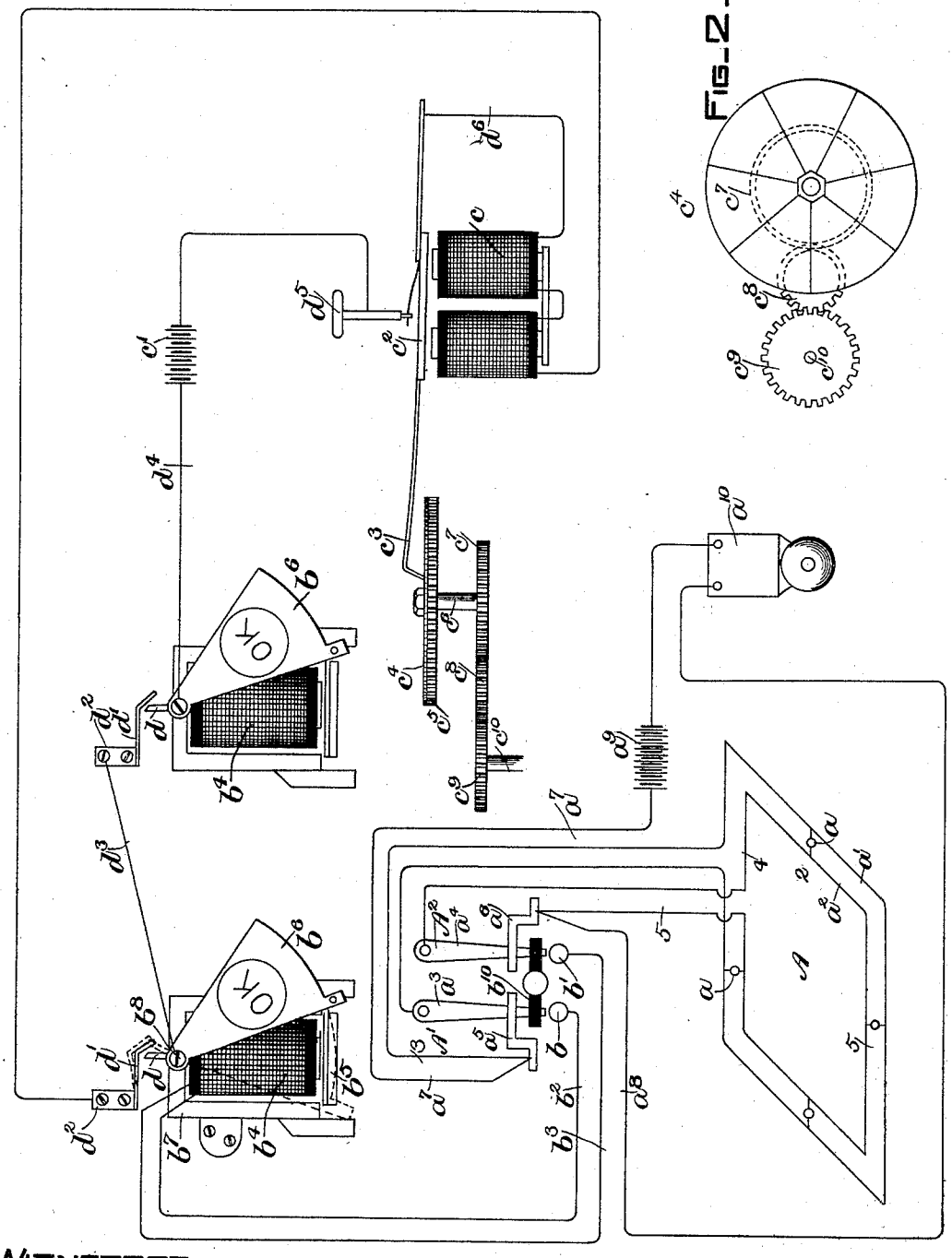

Fig. 1.



Fig. 2.

WITNESSES

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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC FIRE-ALARM SYSTEM.

SPECIFICATION forming part of Letters Patent No. 475,925, dated May 31, 1892.

Application filed January 29, 1892. Serial No. 419,651. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES BURGHER, residing in Newton, county of Middlesex, and State of Massachusetts, have invented an Improvement in Automatic Fire-Alarm Systems, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention is an improvement in automatic fire-alarm systems, and relates more particularly to the testing portion of the system, as will be described.

In automatic fire-alarm systems as now commonly constructed and known to me an alarm located at any convenient or desired point or station may be actuated by the operation of any one of a series of thermostats distributed throughout the building or other structure to be protected, a number of thermostats being usually included in an electric circuit for each floor of the building. The electric circuit for each floor of the building is provided with a testing apparatus, usually a key or circuit-controller, governing the operation of a visual indicating device, usually an annunciator of any well-known construction. As now commonly practiced an inspector or other duly-authorized person operates the key or circuit-controller to operate the visual indicator or annunciator to thus ascertain if the thermostatic circuits on the different floors of the building are in correct working order or condition.

My present invention has for its object to increase the efficiency of the automatic fire-alarm service by making it obligatory for the inspector to test each circuit of the building during stated intervals of time—as, for instance, once in twenty-four hours—and to provide means, as will be described, whereby a failure to test each circuit may be made known to the proper person, such as the owner or occupant of the building. This result is accomplished by providing a recording-instrument having its operation or action controlled in whole or in part, as will be described, by the combined action of preferably all of the visual indicators located in the building and co-operating with the individual thermostatic circuits.

The particular features in which my invention consists will be pointed out in the claims at the end of this specification.

Figure 1 represents in diagram a sufficient portion of an automatic fire-alarm system embodying my invention to enable it to be understood, and Fig. 2 a detail to be referred to.

A may represent one floor of a building or other structure equipped with an automatic fire-alarm system, which may be any of the well-known systems now in use, it being herein shown as the well-known arrangement of the Watkins system. The floor A is provided with a series of thermostats $a$, herein shown as located between and connected to two metallic loops $a'$ $a^2$, which in practice are usually extended to the office of the building, and are therein connected to keys or circuit-controllers $A'$ $A^2$ of any usual or well-known construction and herein represented as composed of levers or arms $a^3$ $a^4$, co-operating with back stops $a^5$ $a^6$, the ends of the loop $a'$ being connected to the lever $a^3$ and back stop $a^5$ and the ends of the loop $a^2$ being connected to the lever $a^4$ and back stop $a^6$. The back stops $a^5$ $a^6$ have also connected to them the positive and negative wires $a^7$ $a^8$ of a battery $a^9$, the wire $a^8$, as herein shown, including in it an alarm bell or gong $a^{10}$, which in practice is preferably located on the outside of the building, or the said gong may be located at any desired place or station. The key-levers $a^3$ $a^4$ are normally in contact with their back stops $a^5$ $a^6$, and when a thermostat is operated, as by a rise in the temperature, such as the breaking out of a fire, the circuit of the battery $a^9$, which is normally open is closed by the operated thermostat connecting the two loops $a'$ $a^2$. For instance, let it be supposed that the thermostat $a$ (marked 2) is operated. In this case the circuit of the battery $a^9$ may be traced as follows, viz: from the positive pole of the battery by wire $a^7$ to the back stop $a^5$, thence by the wire 3 of the loop $a'$ to the thermostat marked 2, from which point there are two paths to the battery, one of which is through the said thermostat and by the wire 4 of the loop $a^2$ to the lever $a^4$, thence by the back stop $a^6$ and wire $a^8$ through the magnets of the bell $a^{10}$ to the negative pole of the battery $a^9$, and the other path from the thermostat is by wire 5 of the loop $a^2$ to the back stop $a^6$ of the lever $a^4$, and thence by

wire $a^8$ to the negative pole of the battery. The circuit-controlling levers $a^3$ $a^4$ are known in practice as the "testing-keys" and having co-operating with them front stops or terminals $b$ $b'$, to which are connected the wires $b^2$ $b^3$ of an electro-magnet $b^4$, provided with an armature $b^5$, controlling the operation of a visual signal, shown as an annunciator-drop $b^6$ of any usual or well-known construction, it being herein shown as pivoted to the magnet-frame $b^7$, as at $b^8$, and provided with the letters "O. K." The key-levers $a^3$ $a^4$ are preferably joined together by a bar $b^{10}$ of insulation, so that both levers may be operated simultaneously, and when the said key-levers are depressed and brought into contact with their front stops or terminals the circuit of the electro-magnet $b^4$ is completed, which circuit may be traced as follows, viz: from the positive pole of the battery $a^9$ by wire $a^7$ to the back stops $a^5$, thence by the loop $a'$ to the key-lever $a^3$, the latter being at such time removed from its back stop and in contact with its front stop $b$, thence by the front stop $b$, wire $b^2$, through the electro-magnet $b^4$, wire $b^3$ to the front stop $b'$, thence by lever $a^4$, loop $a^2$, back stop $a^6$, and thence by wire $a^8$ to the negative pole of the battery $a^9$.

The electro-magnet is energized by the closing of the test-key and its armature $b^5$ is attracted, thereby permitting the visual signal $b^6$ to drop into a position substantially in front of the magnet, and thus indicate that the thermostatic circuits or loops $a'$ $a^2$ are in correct working order. The test-keys in practice are supposed to be operated within predetermined intervals of time—as, for instance, once in twenty-four hours—and it is of the utmost importance that the said circuits should be frequently tested. Each floor of the building which is wired with thermostatic circuits should be tested, and in order to obtain positive evidence that the inspector is attending to his duty in this respect a recording apparatus, controlled in whole or in part by the electro-magnets $b^4$, as will be described, is employed.

The recording apparatus referred to may and preferably will consist of a register-magnet $c$, provided with an armature $c^2$, to which is secured a marking device or pen $c^3$, adapted to make a record upon a recording-surface $c^4$, preferably made as a disk of paper provided with, preferably, seven subdivisions corresponding to the days of the week. The disk $c^4$ is secured to a suitable support or pad $c^5$, (see Fig. 1,) mounted on a shaft $c^6$, provided with a gear $c^7$, connected by an intermediate pinion or gear $c^8$ to a gear $c^9$, fast on the hour-shaft $c^{10}$ of a clock mechanism of any usual or well-known construction and not herein shown. The gears $c^7$ $c^8$ $c^9$ are preferably so proportioned that the gear $c^9$ will make fourteen revolutions while the gear $c^7$ is making one, so that the recording-disk will make a complete revolution under the marking device or pen once a week. The register-magnet $c$ is included in a local circuit containing a local battery $c'$ and also including in it terminals on the visual indicators $b^6$ or operated thereby. As herein shown, each visual indicator $b^6$ is provided with a contact arm or terminal $d$, which is adapted to engage a terminal $d'$, represented as secured to a block or support $d^2$. In the present instance I have represented only two test-magnets $b^4$, the circuit-terminal or contact-arm $d$ of one being connected by wire $d^3$ to the terminal $d'$ of the second test-magnet, the terminal $d$ of the second test-magnet being joined by wire $d^4$ to one pole of the battery $c'$, the other pole of which is represented as joined to the back stop $d^5$ for the armature of the register-magnet, the said armature being connected by wire $d^6$ to one coil of the register-magnet, the other coil of the said magnet being connected by wire $d^7$ to the terminal $d^2$ of the first test-magnet $b^4$.

In accordance with my invention the local circuit of the register-magnet is partially completed by the energizing of each test-magnet, which when energized permits the visual indicator to move so as to bring its contact-arm $d$ into engagement with the co-operating circuit-terminal or contact-arm $d'$, as indicated by dotted lines, Fig. 1. When all the test-circuits have been energized by the inspector operating the test-keys, the circuit of the register-magnet $c'$ may and preferably will be closed, and the pen or marking device $c^3$ is brought into contact with the recording-disk to make a permanent record of the fact that all the thermostatic circuits connected with the test-keys have been operated. It will also be noted that the circuit of the register-magnet remains open at each individual test-magnet $b^4$ until the said test-magnet is energized by operating its test-key, so that the inspector is obliged to operate all the test-keys before he can obtain a record. If after actuating all the test-keys a record is not made, the fact is made known that one or more of the circuits in the building are out of order, and in order to enable the trouble to be located substantially in any instant I prefer to provide the test-magnets with the visual indicators and have the visual indicators effect the closing of the local circuit of the register-magnet, for all the visual indicators will be displayed if the circuits are in working order and only that indicator will not be displayed which is operated by the test-magnet included in the circuit out of order. So, also, I may prefer to have the local circuit of the register-magnet closed when all the visual indicators are operated, as above set forth; but I do not desire to limit myself in this respect, as I may provide the register-magnet circuit with a normally-open circuit-closer or push-button (not shown) which is to be operated by the inspector after he has operated all the test-keys. I prefer to have the circuit-

terminal or contact-arm $d$ operated by the visual indicator $b^6$; but it is evident it may be operated by the armature of the test-magnet.

I claim—

1. In an automatic fire-alarm system, the combination of the following instrumentalities, viz: a thermostatic circuit provided with one or more thermostats, a test-key or circuit-controller connected in the thermostatic circuits, a test-magnet controlled in its operation by the test-key or circuit-controller, an armature for the test-magnet, a recording apparatus, a local circuit in which the said recording apparatus is included, and a circuit-controller governing the condition of said local circuit and controlled in its operation by the armature of the test-magnet, substantially as described.

2. In an automatic fire-alarm system, the combination of the following instrumentalities, viz: a plurality of thermostatic circuits, each containing one or more thermostats, a plurality of test-keys, one for each thermostatic circuit, test-magnets controlled by said test-keys or circuit-controllers, a recording apparatus, a local circuit in which the said apparatus is located, and a plurality of circuit-controllers for said local circuit co-operating with the test-magnets and operated thereby, substantially as described.

3. In an automatic fire-alarm system, the combination, with a plurality of electric circuits provided with circuit-controllers or keys, and with a plurality of electro-magnets controlled by said keys or circuit-controllers, of a recording apparatus, a local circuit in which the said apparatus is located, and a plurality of circuit-controllers for the said local circuit controlled by the plurality of said electro-magnets, substantially as described.

4. In an automatic fire-alarm system, the combination of the following instrumentalities, viz: a plurality of thermostatic circuits, each containing one or more thermostats, a plurality of test-keys, one for each thermostatic circuit, test-magnets controlled by said test-keys or circuit-controllers, visual indicators operated by said test-magnets, a recording apparatus, a local circuit in which the said apparatus is located, and a plurality of circuit controllers for said local circuit operated by the visual indicators, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES BURGHER.

Witnesses:
JAS. H. CHURCHILL,
SADIE C. FEARING.