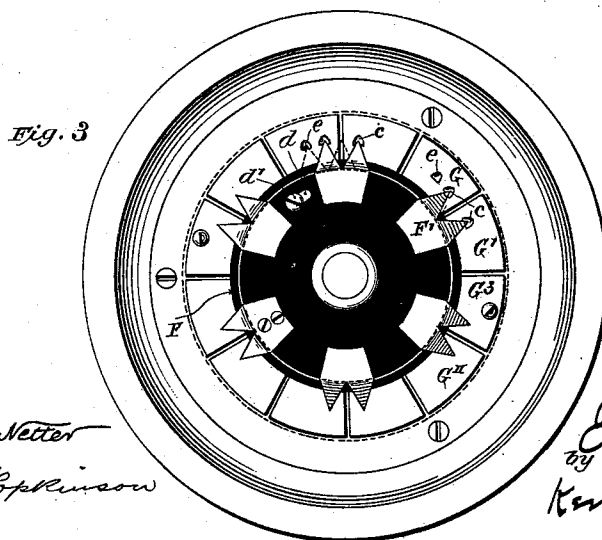
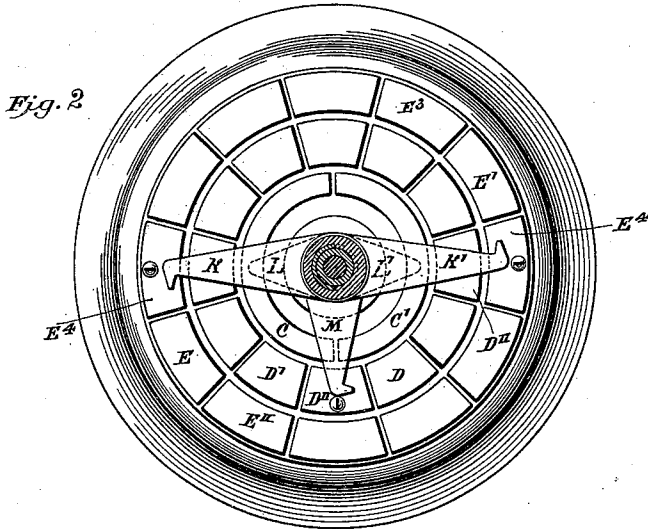
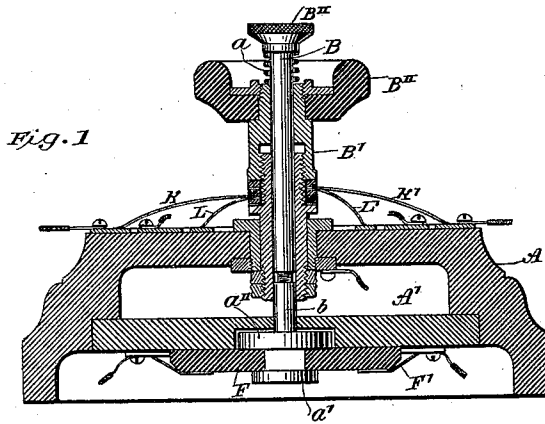


(No Model.)

2 Sheets—Sheet 1.

J. S. MORSE.
COMBINED ELECTRICAL PROTECTIVE AND TIME DETECTING SYSTEM.
No. 466,505.

Patented Jan. 5, 1892.



Witnesses:
Raphael Netter
Ernest Hopkinson

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Jamies S. Morse.
by *Kerr & Currier.*
Attorneys.

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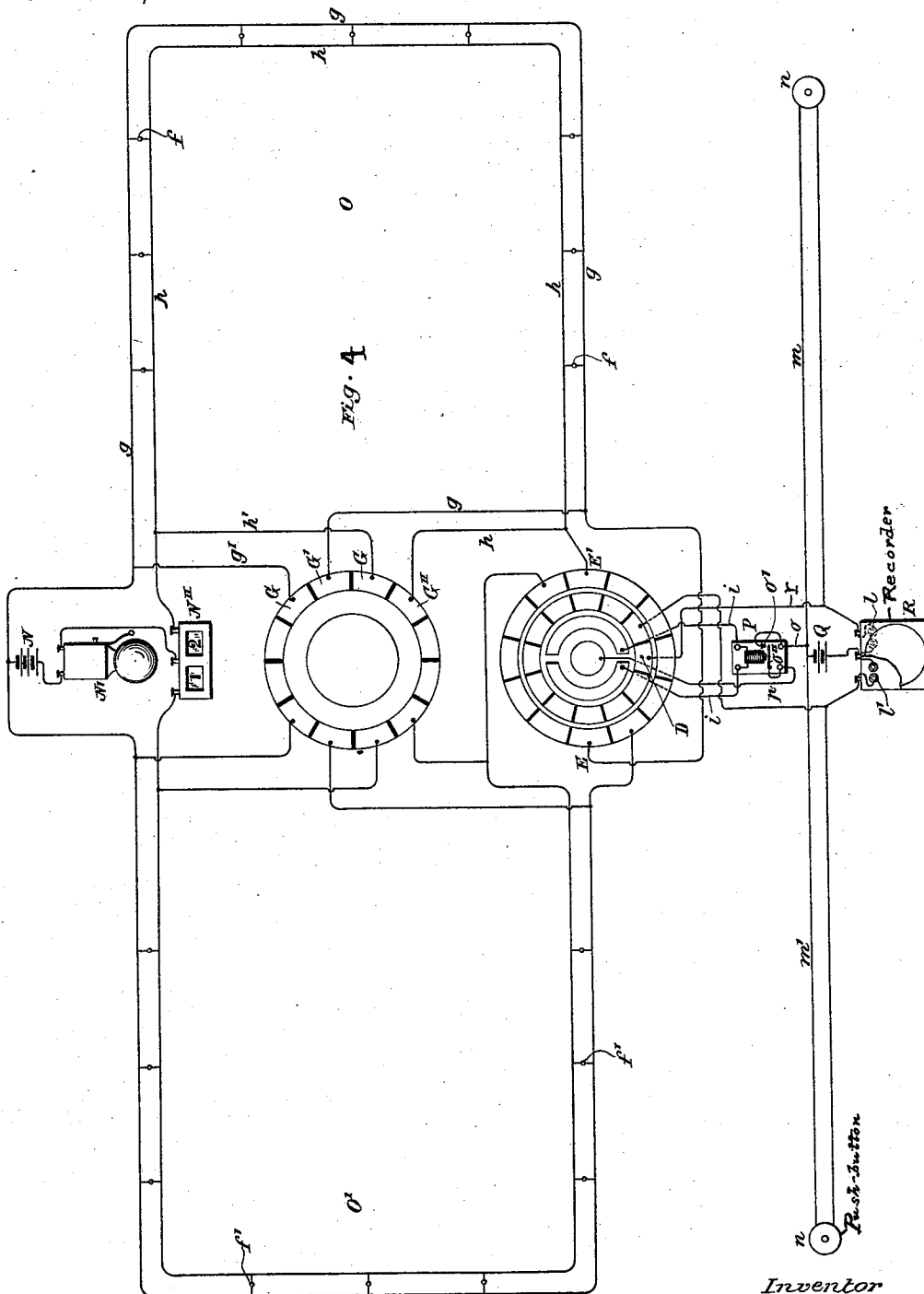
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UNITED STATES PATENT OFFICE.

JAMIN S. MORSE, OF NEW YORK, N. Y.

COMBINED ELECTRICAL PROTECTIVE AND TIME-DETECTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 466,505, dated January 5, 1892.

Application filed June 5, 1891. Serial No. 395,258. (No model.)

To all whom it may concern:

Be it known that I, JAMIN S. MORSE, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in a Combined Electrical Protective and Time-Detecting System, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

Nearly all large stores, warehouses, and manufacturing establishments are provided with some form of automatic fire-alarm or protective systems. These systems are trustworthy and valuable only in proportion to the comparative certainty of their operation, or rather the impossibility of their derangement or failure from any cause to act at the right time, so that it is customary to provide some means of ascertaining at short intervals of time the exact condition of the system or circuits in order that any defects or derangements may be at once remedied. In some cases the local protective circuits form part of a general system involving a central station at which all signals are received and indications of breaks, crosses, or other defective conditions of a main or local circuit recorded or from which at proper intervals of time the requisite tests are made. In other cases each local or protective circuit is a complete system in itself, and an attendant or watchman is employed, whose duties are to watch the annunciator and alarm and test the condition of the circuit at frequent intervals; but this plan, while perhaps the surest, if properly carried out, is only effective when the watchman is faithful and attentive to duty. As a check on the watchman, to detect any negligence and in order to show any failure in the performance of his duty, it is usual to employ a watchman's time-detector, a well-known device or apparatus, upon which the watchman makes a record of his rounds or presence at stated intervals of time. My purpose is to produce a system which shall be a combination of the two latter and to provide a simple and economical means of accomplishing this which shall be applied directly to any existing protective plant or system of the kind described, by or in the operation of

which a record will be made of the time and results of the tests of the circuits. In devising means for carrying out this main purpose I have invented certain other improvements, the nature of which will more fully hereinafter appear.

Generally described, my improved system consists of one or more thermostatic circuits with the usual annunciator, alarm-bell, and battery, a circuit-controlling mechanism, an instrument of the nature of an electrical watchman's time-detector, and auxiliary circuit-connections so combined that the time of every operation of the switch, which closes for purposes of testing any of the thermostatic circuits, is recorded as well as the character of the test—that is to say, whether the circuits are complete or interrupted.

The details of a system which illustrates and contains my invention I have shown in the accompanying drawings.

Figure 1 is a vertical central section of the switch mechanism which I employ. Fig. 2 is a top plan view of the same. Fig. 3 is a plan view of the under side of the base of the switch. Fig. 4 is a diagram illustrating the system and circuit connections of the same with which the switch is employed.

The specific mechanical construction of the switch mechanism which I prefer to employ depends upon the number of circuits with which it is employed; but the principle of construction is in all cases the same. As a whole, however, the construction of the switch may be very greatly modified and varied and many appliances capable of accomplishing the same result substituted for it.

On the upper surface of the insulating-base A of the switch are secured concentrically to a metal spindle B two contact-plates C C', a series of plates D D' D'', &c., and an outer series of similar contacts E E' E'', &c. The spindle B extends down through the base A and an insulating-plate A', secured thereto, and carries at its end a circular disk F, of insulating substance, to the edge of which bent metal plates F' are secured. These plates sweep over a circular series of contact-plates G G' G'', secured to the under side of the plate A'. The insulating-disk F is held between the disks a' a'', the latter being pro-

vided with a stem *b*, into which the lower end of the spindle B screws. Around the spindle B is a hollow spindle B', set in a bushing in the base A and secured against vertical movement therein in any proper manner.

Each of the concentric spindles B B' is provided with a head, as B'', and between them is a spiral spring *a*, which, pressing the inner spindle B upward, maintains the contacts F' in good contact with plates G G' G''. In their normal position the points of the plates F' rest on and connect together the plates G G' in pairs, and it is desirable, in order to prevent the disk F from being displaced, that the ends of plates F' rest in notches *c* or that some similar stops be provided for the same purpose. A slot *d* is cut in the disk F, through which projects a screw *d'*, set in the plate A', and this limits the rotary movement of said disk. When the switch is to be used, the spindle B is pushed down to disengage the points of the plate F' and then turned to shift the said points, so that each plate F' rests on one of the plates G G', &c. In this position the points of plates F' or one point of each plate may engage with other notches *e*. The outer spindle B' may then be turned without displacing the disk F.

The spindle B' carries contact-arms K K' L L' and an arm M. (Shown in Fig. 2.) These are of resilient metal and press upon the plates as follows: K K' on plates E E' E'', L L' on plates C C', and M on plates D D' D''. Arm M is in contact with the spindle B'. K and L are in metallic contact with each other, but insulated from the spindle B' and also from K' L', which are also in metallic contact with each other.

I refer now to Fig. 4 for a description of the application and mode of operation of the switch. The diagram represents a system of automatic fire-alarm circuits, such as would be contained in a warehouse. For convenience of illustration but two circuits or branches are shown in detail. N is the battery for the system, N' the alarm-bell, and N'' the annunciator to which the different branches of the circuit lead. These, together with the switch or testing mechanism and the recorder, are generally placed in the office or some other selected room to which all the circuits run from the different rooms or portions of the building. O represents one of such circuits, O' another, and *f f'* the thermostats which are included in branches or derivations of the same. Should a fire occur in the vicinity of any of the thermostats, the latter close the circuit and give the alarm and drop the shutter of the annunciator that shows the location of the fire. This system is well known and requires no further explanation, except in so far as may be necessary herein to an understanding of the improvements which comprise the present invention. Each circuit being a counterpart of the others so far as its connections with the various devices is concerned, an explanation of one will serve for all. Of

the circuit O the wire *g* runs from the battery N through a given room and returns to the switch, where it is connected to the plate G', which is any one of the plates above described as located beneath the base of the switch. The next adjacent plate G, which is normally connected to G' by one of the contacts F', is connected to the wire *g* near the battery by a wire *g'*. In a similar manner the other wire *h* of circuit O, running parallel to wire *g*, is connected to plate G'', and a wire *h'* connects the companion plate G³ with the wire *h* near the battery. Two paths are thus provided through which a current may flow in case of the action of any of the thermostats. This is desirable in case there should be a break due to any cause in either or both of the wires *g h*.

In order to be assured that the circuit O is in proper condition to send in an alarm it must be properly tested at frequent intervals, and in order to preserve a record of these tests the following provision is made: The wire *g* is connected to any one of the outer series of contact-plates on the switch, as E, and wire *h* is connected to the diametrically-opposite plate E'. Then to make and record a test the following means are provided: Normally the switch stands with the arms K K' resting on any two diametrically-opposite plates, as E⁴ E⁴, which are dead-plates and not connected with any circuit. The first operation is to depress and turn the spindle B to disconnect the plates G G' and G'' G³, and thereby interrupt the circuit through wires *g' h'*, so that the test may be made only through that part of the circuit O that contains the thermostats. Then the arms K K' are shifted onto the plates E E'. The circuit is thus completed from wire *g* and plate E to strip K, and thence through strip or arm L, plate C, conductors *i i*, connecting the plate C to plate C', and then from plate C' through arms L' K' and plate E' to wire *h*. This closes the circuit O, rings the alarm N', and drops the annunciator-shutter of circuit O, showing at a glance that this circuit is in proper working order. The conductors *i i*, forming a bridge between plates C C', include the coils of a relay-instrument P, that controls the circuits of a time-recording instrument R.

The details of this instrument being entirely a matter of choice, it suffices in explanation to say that it may be, for example, any of the well-known instruments known in the art as watchmen's "time detectors or recorders," which contain two or more electromagnets, as *l l'*, in independent circuits, and which make on different portions of a disk or strip moved by clock-work a mark or record whenever energized by the closing of their respective circuits. Usually the circuits, as *m m'*, of the magnets *l l'* run to different apartments or portions of the building, where push-buttons or circuit-closers *n* are provided by which the watchman on his rounds sends

in a signal to the recorder, which will show how many times and when he visited the different circuit-closers.

Q is the battery for operating the recorder-magnets. One pole of this battery is connected by wire *o* with the front contact *o'* of the relay P. The circuit-controlling armature *o''* of the relay is connected by wire *p* with the spindle B of the switch, and consequently with the arm M, that sweeps over the plates D D', &c. The arm M, being at right angles to arms K K', rests on a plate D'' when the said arms K K' are on the dead-plates E⁴. This plate D'' is also a dead-plate and not connected with any circuit. If the switch be turned so that arms K K' rest on plates E E', the arm M rests on a plate D, which by a wire *r* is connected to the battery Q and includes one of the recorder-magnets, as *l*, which makes the appropriate mark or record for the circuit O, which is connected to plates E E'. Hence, if circuit O be in working order the relay P will close a break in the circuit of all of the recorder-magnets, and the arm M closes a break in that particular circuit which corresponds to circuit O. The marks or records made by the magnet *l* will therefore indicate that the circuit O was tested at times corresponding to their positions on the record-sheet and that said circuit at such times was in working order. The absence of record-marks would show either that no test was made or that a test having been made the circuit O was out of repair.

It is easy to provide a certain number of watchman's circuits, as *m m'*, in addition to the thermostat-circuits, when, as a matter of precaution, the watchman is required to visit different points in the building in addition to testing the fire-alarm circuits. It will now be understood from the above how any other of a number of circuits may be tested and the tests recorded.

In practice each circuit may be tested once by turning the switch through a complete or partial revolution, or the same circuits may be connected to more than one pair of plates, as E E', so that it will be tested twice or more times for one operation or movement of the switch. The applicability of this system to many different purposes will be readily understood by those skilled in the art.

It is apparent that one of the chief merits of the particular improvement described is in its adaptability to existing systems, to any of which it may be applied by merely making the necessary electrical connections.

What I claim is—

1. The combination, with a system of thermostat-circuits centering at a given point, a time-recording mechanism, and independent recording-circuits corresponding to the thermostat-circuits, of a switch or bridge for simultaneously closing breaks in corresponding thermostat and recording circuits, an electromagnet included in the circuit of the bridge,

and a circuit-controller in the recording-circuits operated thereby, as set forth.

2. The combination, with the recording-circuits of a watchman's time-detector, of one or more fire-alarm circuits containing thermostats, a circuit-controlling mechanism for the recording-circuits dependent for operation upon currents in the thermostat-circuits, and a switch for simultaneously closing breaks in corresponding thermostat and recording circuits, as set forth.

3. The combination, with a fire-alarm and annunciator and a system of protective circuits containing thermostats and extending from the annunciator to the rooms of the building to be protected, of a time-recording instrument of the kind described, provided with recording-circuits corresponding to the thermostat-circuits, a circuit-controller common to all said recording-circuits and dependent for operation upon current in that one of the thermostat-circuits in which it may be included, and a test-switch provided with terminal-plates to which the conductors of the thermostat and recording circuits are connected, substantially as described.

4. The combination, with a system of thermostat-circuits and a corresponding system of recording-circuits, including the magnets of a watchman's time-detector, and a circuit-controller common to all the recording-circuits, of a test-switch to which all of said circuits are connected, and consisting, essentially, of series of contact-plates and contacts adapted in their movements to pass in contact with each series of plates, respectively, the electrical connections between the circuits and the plates being made in such manner or order that a movement of the contacts into any given position simultaneously closes breaks in the thermostat-circuit and its corresponding recording-circuit connected with the plates upon which said contacts rest and includes the circuit-controlling device of the recording-circuits in said thermostat-circuit.

5. The combination, with a system of thermostat-circuits and a system of corresponding recording-circuits from a watchman's time-detector and a circuit-controller common to all of the said recording-circuits, of a test-switch intermediate to the two systems of circuits, and consisting of a circular series of plates to which the terminals of the thermostat-circuits are connected, a concentric series of plates to which one conductor of each recording-circuit is connected, two concentric plates permanently connected through the circuit-controller of the recording-circuits, a central spindle to which the opposite conductors of all the recording-circuits are connected, and contact-arms carried thereby and adapted to simultaneously close through the said circuit-controller any given thermostat-circuit and its corresponding recording-circuit, as set forth.

6. The combination, with the thermostat

and corresponding recording circuits, of the switch with which said circuits are connected, consisting of an insulating-base, the concentric spindles turning therein, one of said spindles being movable vertically in the other, contact-plates secured to the upper and lower faces of the base, and contacts engaging therewith and carried by said spindles, as set forth.

7. The switch mechanism herein described, consisting in the combination, with the insulating plate or base, the circular series of contacts under the base, and the concentric series of contacts on the upper face of the same, of a rotary spindle carrying contact-arms engaging with the series of plates on the upper face of the base, a spindle concentric with the first and movable vertically therein, carrying contacts engaging with the series of

contacts under the base, and a spring acting on the central spindle, whereby the same is normally raised, as set forth.

8. The combination, with a series of thermostats and a corresponding system of recording-circuits, of a switch having concentric spindles carrying contact-arms and contact-plates to which said circuits are connected, one of said spindles and the arms carried thereby being adapted when shifted to cut out portions of the thermostat-circuits, the other to close simultaneously one of the thermostat-circuits and its corresponding recording-circuit, as herein set forth.

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Witnesses:

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